No. 98-404

In the Supreme Court of the United States

OCTOBER TERM, 1998

UNITED STATES DEPARTMENT OF COMMERCE, ET AL., APPELLANTS

v.

UNITED STATES HOUSE OF REPRESENTATIVES, ET AL.

ON APPEAL FROM THE UNITED STATES DISTRICT FOR THE DISTRICT OF COLUMBIA

JOINT APPENDIX

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UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

CIVIL DOCKET No. 98-CV-456

UNITED STATES HOUSE OF
REPRESENTATIVES, PLAINTIFF

v.

THE UNITED STATES DEPARTMENT OF
COMMERCE, ET AL., DEFENDANTS AND
CITY OF LOS ANGELES, ET AL.,
PROPOSED INTERVENOR-DEFENDANTS

TYPE E APPEAL

Filed: 02/20/98

Assigned to: Judge Royce C. Lamberth
Judge Ricardo M. Urbina
Circuit Judge Douglas H. Ginsbu
Demand: $0,000 Nature of Suit: 890
Lead Docket: None Jurisdiction: US Plaintiff
Dkt# in other court: None

Cause: 30:1276 Interior: Review of Agency Action
Case type: 1. civil 2. null

DOCKET ENTRIES

DATE		PROCEEDINGS
2/20/98	1	COMPLAINT filed by plaintiff U.S. HOUSE OF REPRESENTATIVES (st) [Entry date 02/24/98]
		* * * * *
2/20/98	2	MOTION (APPLICATION) filed by plaintiff U.S. HOUSE OF REP. for Three-Judge Court (st) [Entry date 02/24/98]
2/24/98	3	ORDER by Judge Royce C. Lamberth: granting motion for Three-Judge Court [2-1] by U.S. HOUSE OF REP. (N) (emh) [Entry date 02/25/98]
3/2/98	4	COPY of Order filed in USCA dated 2/24/98, by Chief Judge Edwards designating Circuit Judge Merrick B. Garland and District Judge Ricardo M. Urbina to serve with District Judge Royce C. Lamberth to hear and determine this case. (gt)
3/2/98	—	CASE ASSIGNED to Three Judge Panel consisting of District Judge Royce C. Lamberth, Circuit Judge Merrick B. Garland and District Judge Ricardo M. Urbina. (gt)
3/4/98	5	MOTION filed by plaintiff U.S. HOUSE OF REP. to expedite this action (st) [Entry date 03/06/98]

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3/27/98	11	MOTION filed by intervenor-deft. RICHARD A. GEPHARDT, intervenor-deft. DANNY K. DAVIS, intervenor-deft. JUANITA MILLENDER-MCDONALD, intervenor-deft. LUCILLE ROYBAL-ALLARD, intervenor-deft. LOUISE M. SLAUGHTER, intervenor-deft. BENNIE G. THOMPSON for to intervene as defendants EXHIBIT (answer) (st) [Entry date 03/30/98]
		* * * * *
4/1/98	13	MOTION filed for LEGISLATURE OF CA, CALIFORNIA SENATE, JOHN CHARLES BURTON, THE CALIFORNIA ASSEM, ANTONIO VILLARAIGOSA to intervene in this case as defendants EXHIBIT (motion to dismiss) (bjs) [Entry date 04/02/98]
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4/3/98	17	MOTION filed by intervenor-deft. CITY OF LOS ANGELES, intervenor-deft. CITY OF NEW YORK, intervenor-deft. COUNTY OF LOS ANGELE, intervenor-deft. CITY OF CHICAGO, intervenor-deft. CITY AND COUNTY OF, intervenor-deft. MIAMI-DADE COUNTY, intervenor-deft. CITY OF INGLEWOOD, intervenor-deft. CITY OF HOUSTON, intervenor-deft. CITY OF SAN ANTONIO, intervenor-deft. CITY AND

COUNTY, intervenor-deft. CITY OF LONG BEACH, intervenor-deft. CITY OF SAN JOSE, CA, intervenor-deft. CITY OF STAMFORD, intervenor-deft. CITY OF OAKLAND/CA, intervenor-deft. CITY OF OAKLAND/CA, intervenor-deft. CITY OF CUDAHY, intervenor-deft. CITY OF SANTA CLARA, intervenor-deft. COUNTY OF SAN BERNAD, intervenor-deft. COUNTY OF ALAMEDA, intervenor-deft. COUNTY OF RIVERSIDE, intervenor-deft. STATE OF NEW MEXICO, intervenor-deft. U.S. CONFERENCE, intervenor-deft. LEAGUE OF WOMEN, intervenor-deft. CAROLYN MALONEY, intervenor-deft. CHRISTOPER SHAYS, intervenor-deft. TOM SAWYER, intervenor-deft. ROD BLAGOJEVICH, intervenor-deft. BOBBY RUSH, intervenor-deft. LUIS GUITIERREZ, intervenor-deft. JOHN CONYERS JR, intervenor-deft. JOSE-SERRANO, intervenor-deft. CYNTHIA MCKINNEY, intervenor-deft. CHARLES-RANGEL, intervenor-deft. DONALD-PAYNE, intervenor-deft. HOWARD BERMAN, intervenor-deft. XAVIER BECCERA, intervenor-deft. LORETTA SANCHEZ, intervenor-deft. JULIAN DIXON, intervenor-deft. HENRY WAXMAN, intervenor-deft. MAXINE WATERS, intervenor-deft. ESTEBAN-TORRES, intervenor-deft. SHEILA JACKSON LEE to intervene as defendants EXHIBIT (proposed answer)

(st) [Entry date 04/07/98] [Edit date 04/07/98]

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4/6/98	19	MOTION filed by plaintiff U.S. HOUSE OF REP. for summary judgment (st) [Entry date 04/07/98]
4/6/98	20	MOTION filed by federal defendant DOC, federal defendant WILLIAM M. DALEY, federal defendant BUREAU OF THE CENSUS, federal defendant JAMES F. HOLMES to dismiss complaint [1-1] (st) [Entry date 04/07/98]
4/6/98	21	MOTION filed by intervenor-deft. RICHARD A. GEPHARDT, intervenor-deft. DANNY K. DAVIS, intervenor-deft. JUANITA MILLENDER-MCDONALD, intervenor-deft. LUCILLE ROYBAL-ALLARD, intervenor-deft. LOUISE M. SLAUGHTER, intervenor-deft. BENNIE G. THOMPSON to dismiss complaint [1-1] pursuant to Rule 12(b)(6)c) (st) [Entry date 04/07/98]

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4/13/98	26	MOTION filed by intervenor-deft. NATL KOREAN AMER, intervenor-deft. ORG OF CHINESE AMER, intervenor-deft. SEARCH TO INVOLVE, intervenor-deft. UNITED CAMBODIAN, intervenor-deft. LEAGUE/UNITED LATIN, intervenor-deft. CA LEAGUE/UNITED, intervenor-

deft. NATL ASSOC LATINO, intervenor-deft. MOTHERS OF EAST LOS, intervenor-deft. HEE-SOOK KIM, intervenor-deft. MICHAEL BALAOING, intervenor-deft. SOVANN TITH, intervenor-deft. JOHNNY M. RODRIGUEZ, intervenor-deft. CHAYO- ZALDIVAR, intervenor-deft. GILBERTO FLORES, intervenor-deft. ALVIN PARRA for to intervene EXHIBTI (PROPOSED ANSWER) (st) [Entry date 04/14/98] [Edit date 04/14/98]

* * * * *

4/21/98 35 COPY of Order filed in USCA dated 4/10/98, by Chief Judge Harry T Edwards, that Circuit Judge Douglas H. Ginsburg is hereby designated to serve in lieu of Circuit Judge Merrick B. Garland to serve with District Judge Royce C. Lamberth and District Judge Ricardo M. Urbina to hear and determiner this case. referencing , . (gt)

* * * * *

5/4/98 45 MEMORANDUM by federal defendant DOC, federal defendant WILLIAM M. DALEY, federal defendant BUREAU OF THE CENSUS, federal defendant JAMES F. HOLMES in opposition to motion for summary judgment [19-1] by U.S. HOUSE OF REP. (st) [Entry date 05/05/98]

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5/4/98 53 MEMORANDUM by intervenor-deft. RICHARD A. GEPHARDT, intervenor-deft. DANNY K. DAVIS, intervenor-deft. JUANITA MILLENDER-MCDONALD, intervenor-deft. LUCILLE ROYBAL-ALLARD, intervenor-deft. LOUISE M. SLAUGHTER, intervenor-deft. BENNIE G. THOMPSON in opposition to motion for summary judgment [19-1] by U.S. HOUSE OF REP. (st) [Entry date 05/05/98]

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5/4/98 57 MEMORANDUM by intervenor-deft., movant, intervenor-deft., movant, intervenor-deft., movant, intervenor-deft., movant in opposition to motion for sum-

mary judgment [19-1] by U.S. HOUSE OF REP. (st) [Entry date 05/12/98]

5/5/98 55 RESPONSE by intervenor-deft. RICHARD A. GEPHARDT, intervenor-deft. DANNY K. DAVIS, intervenor-deft. JUANITA MILLENDER-MCDONALD, intervenor-deft. LUCILLE ROYBAL-ALLARD, intervenor-deft. LOUISE M. SLAUGHTER, intervenor-deft. BENNIE G. THOMPSON to motion for summary judgment [19-1] by U.S. HOUSE OF REP. (st) [Entry date 05/07/98]

* * * * *

5/22/98 64 MOTION (APPLICATION) filed by movants City of Los Angeles, et al to join and joinder in the motions to dismiss pursuant to Federal Rule of Civil Procedure 12(b)(6) (st) [Entry date 05/26/98]

5/22/98 65 REPLY by movant RICHARD A. GEPHARDT, movant DANNY K. DAVIS, movant JUANITA MILLENDER-MCDONALD, movant LUCILLE ROYBAL-ALLARD, movant LOUISE M. SLAUGHTER, movant BENNIE G. THOMPSON to response to motion to dismiss complaint [1-1] pursuant to Rule 12(b)(6)c) [21-1] by movant (st) [Entry date 05/26/98]

5/22/98 66 REPLY by plaintiff U.S. HOUSE OF REP. to response to motion for summary

judgment [19-1] by U.S. HOUSE OF REP.; exhibits (3) (st) [Entry date 05/26/98]

* * * * *

5/22/98 67 REPLY by federal defendant DOC, federal defendant WILLIAM M. DALEY, federal defendant BUREAU OF THE CENSUS, federal defendant JAMES F. HOLMES to response to motion to dismiss complaint [1-1] [20-1] by federal defendant; exhibit (1) (bulky) (st) [Entry date 05/26/98]

6/10/98 78 NOTICE OF SUPPLEMENTAL AUTHORITY by plaintiff U.S. HOUSE OF REP. (st) [Entry date 06/11/98]

* * * * *

6/11/98 — MOTION HEARING before Judges Douglas H. Ginsburg, Royce C. Lamberth, and Ricardo M. Urbina taken under advisement by movant motion to dismiss complaint [1-1] pursuant to Rule 12(b)(6)c) [21-1], taken under advisement by federal defendant motion to dismiss complaint [1-1] [20-1], taken under advisement by U.S. HOUSE OF REP. motion for summary judgment [19-1] Reporter: Theresa Sorensen (emh) [Entry date 08/24/98]

* * * * *

8/24/98 90 MEMORANDUM OPINION by Judges Royce C. Lamberth, Douglas H. Ginsburg, and Ricardo M. Urbina. (N) (emh)

8/24/98 91 ORDER by Judges Royce C. Lamberth, Douglas H. Ginsburg and Ricardo M. Urbina: denying motion to dismiss complaint [1-1] pursuant to Rule 12(b)(6)c) [21-1] by movant, denying motion to dismiss complaint [1-1] [20-1] by federal defendant, granting motion for summary judgment [19-1] by U.S. HOUSE OF REP. and entering summary judgment for plaintiff; permanently enjoining defendants from using any form of statistical sampling. (N) (emh)

8/25/98 92 NOTICE OF APPEAL by federal defendant DOC to the U.S. Supreme Court from order [91-1], entered on: 8/24/98 (st) [Entry date 08/26/98] [Edit date 09/01/98]

8/28/98 93 NOTICE OF APPEAL by movant LEGISLATURE OF CA, movant CALIFORNIA SENATE, movant JOHN CHARLES BURTON, movant THE CALIFORNIA ASSEM, movant ANTONIO VILLARAIGOSA to the U.S. Supreme Court from order [91-1], entered on: 8/24/98 (st) [Entry date 08/31/98] [Edit date 09/01/98]

8/28/98 94 NOTICE OF APPEAL by movant NATL KOREAN AMER, movant ORG OF CHINESE AMER, movant SEARCH TO INVOLVE, movant UNITED CAMBODIAN, movant LEAGUE/UNITED LA-

TIN, movant CA LEAGUE/UNITED, movant NATL ASSOC LATINO, movant MOTHERS OF EAST LOS, movant HEE-SOOK KIM, movant MICHAEL BALAOING, intervenor-deft. CHAYO ZALDIVAR, movant ALVIN PARRA from order [91-1] to the U.S. Supreme Court, entered on: 8/24/98. (st) [Entry date 09/01/98] [Edit date 09/01/98]

8/31/98 95 NOTICE OF APPEAL by movant CITY OF LOS ANGELES, movant CITY OF NEW YORK, movant COUNTY OF LOS ANGELE, movant CITY OF CHICAGO, movant CITY AND COUNTY OF, movant MIAMI-DADE COUNTY, movant CITY OF INGLEWOOD, movant CITY OF HOUSTON, movant CITY OF SAN ANTONIO, movant CITY OF SAN JOSE, CA, movant CITY OF STAMFORD, movant CITY OF OAKLAND/CA, movant CITY OF CUDAHY, movant CITY OF SANTA CLARA, intervenor-deft. COUNTY OF SAN BERNAD, movant COUNTY OF ALAMEDA, movant COUNTY OF RIVERSIDE, movant STATE OF NEW MEXICO, movant U.S. CONFERENCE, movant LEAGUE OF WOMEN, intervenor-deft. CAROLYN MALONEY, movant CHRISTOPER SHAYS, movant TOM SAWYER, movant ROD BLAGOJEVICH, movant BOBBY RUSH, movant LUIS GUITIERREZ, movant JOHN CONYERS JR, movant JOSE SERRANO, movant CYNTHIA

MCKINNEY, movant CHARLES RANGEL, intervenor-deft. DONALD PAYNE, movant HOWARD BERMAN, movant XAVIER BECCERA, movant LORETTA SANCHEZ, movant JULIAN DIXON, movant HENRY WAXMAN, movant MAXINE WATERS, movant ESTEBAN TORRES, movant SHEILA JACKSON LEE from order [91-1], entered on: 8/24/98. to the U.S Supreme Court (st) [Entry date 09/01/98]

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

CASE No. 1:98-CV-00456

UNITED STATES HOUSE
OF REPRESENTATIVES,
WASHINGTON, D.C. 20515, PLAINTIFF

v.

THE UNITED STATES DEPARTMENT
OF COMMERCE; AND WILLIAM M. DALEY,
IN HIS CAPACITY AS SECRETARY OF THE UNITED
STATES DEPARTMENT OF COMMERCE
14TH & CONSTITUTION AVENUES, N.W.
WASHINGTON, D.C. 20230

AND

BUREAU OF THE CENSUS, AN AGENCY WITHIN
THE UNITED STATES DEPARTMENT OF COMMERCE; AND
JAMES F. HOLMES, IN HIS CAPACITY AS ACTING
DIRECTOR OF THE BUREAU OF THE CENSUS, ROOM 2049,
BUILDING 3 WASHINGTON, D.C. 20233-0100,
DEFENDANTS

[02/20/98]

COMPLAINT FOR DECLARATORY AND INJUNCTIVE RELIEF

For 200 years, the government officials who have taken the decennial census for the purpose of legislative apportionment have conducted an actual enumeration

of the populace, by attempting to count all the people, in accordance with the mandates of the Constitution and Congress. Defendants now seek to abandon that course. Defendants have adopted a program for conducting the 2000 census that has no precedent in our Nation's history. Defendants do not plan to count every person who may be found. Instead, Defendants plan to use population estimates based upon statistical methods commonly referred to as "sampling" for the apportionment of the House of Representatives. Congress has determined that Defendants' plan poses such serious risks to the people and the political institutions of this Country that it adopted legislation, which the President signed, authorizing either House of Congress to seek immediate declaratory and injunctive relief in this Court. The House of Representatives brings this action pursuant to that specific authorization, and respectfully requests this Court to enjoin Defendants from using sampling to determine the population for the purpose of apportionment, and to declare that such use of sampling is unlawful because the Constitution and the Census Act, 13 U.S.C. § 195, forbid it.

PARTIES

1. Plaintiff United States House of Representatives is directly affected and aggrieved by Defendants' unlawful decision to use sampling in connection with the 2000 census to determine the population for the purpose of apportionment. Suit by the House to challenge this use of sampling is specifically authorized by § 209 of the Department of Commerce, Justice, State, the Judiciary, and Related Agencies Appropriations Act, 1988, P.L. 105-119, 111 Stat. 2440 (Nov. 26, 1997) (the "1998 Appropriations Act"). This suit has been

commenced at the direction of Newt Gingrich, Speaker of the House of Representatives, pursuant to § 209(g) of the 1998 Appropriations Act.

2. Defendant United States Department of Commerce is a department within the executive branch of the United States and an agency of the United States.

3. Defendant William M. Daley is the Secretary of Commerce. He is a defendant solely in his official capacity.

4. Defendant Bureau of the Census is an agency within the Commerce Department.

5. Defendant James F. Holmes is the Acting Director of the Bureau of the Census. He is a defendant solely in his official capacity.

JURISDICTION AND VENUE

6. This action arises out of Defendants' adoption of a program to use sampling in the 2000 census to determine the population of the United States for the purpose of apportioning Members of the House of Representatives among the several States. Defendants' program violates Article I, § 2, cl. 3, and Section 2 of the Fourteenth Amendment to the United States Constitution, as well as the Census Act. The Court has jurisdiction of this action pursuant to § 209 of the 1998 Appropriations Act and 28 U.S.C. § 1331.

7. Plaintiff seeks declaratory, injunctive, and other appropriate relief under § 209(b) of the 1997 Act.

8. Plaintiff is entitled to have this action heard and determined by a three-judge district court pursuant to § 209(e)(1) of the 1998 Appropriations Act.

9. Venue is proper in this district pursuant to 28 U.S.C. § 1391(e).

STATEMENT OF FACTS

10. Section 2 of the Fourteenth Amendment to the United States Constitution provides that Members of the House of Representatives are to be "apportioned among the several States according to their respective numbers."

11. Pursuant to Article I of the Constitution, the population of the United States is determined for the purpose of the apportionment of Representatives by means of a decennial census. U.S. Const., Art. I, § 2, cl. 3. Although the decennial census and other periodic censuses are and historically have been used to collect a great deal of information that is used for various purposes, the sole constitutional purpose of the decennial census is to enable the apportionment of Representatives among the several States.

12. Article I of the Constitution requires that the decennial census be an "actual Enumeration" of the population. U.S. Const., Art. I, § 2, cl. 3.

13. The Fourteenth Amendment to the Constitution requires that Representatives be "apportioned among the several States according to their respective numbers, counting the whole number of persons in each State." U.S. Const., Amend. XIV, § 2.

14. The Constitution entrusts Congress with a mandatory duty to conduct the census. Congress is required to "direct by law" the "Manner" in which the census is conducted, and the Constitution further requires that the census be taken "within every . . . Term of ten years." U.S. Const., Art. I, § 2, cl. 3.

15. Pursuant to Art. I, § 2, cl. 3 of the Constitution, Congress has directed the Secretary of Commerce (the "Secretary") and the Bureau of the Census, an agency within the Department of Commerce, to conduct the census. 13 U.S.C. §§ 2, 4, 21, 141(a). Congress expressly prohibited the Department of Commerce from using sampling to determine the population for the purpose of apportionment. The Census Act provides that, "[*e*]*xcept for the determination of population for purposes of apportionment*, the Secretary shall, if he considers it feasible, authorize the use of the statistical method known as 'sampling' in carrying out the provisions of this title." 13 U.S.C. § 195 (emphasis added).

16. The Census Act provides further that the decennial census is to be a determination of the population as of the first day of April of the year in which the census is taken. 13 U.S.C. § 141(a). The Secretary is required within nine months thereafter —*i.e.*, no later than December 31—to tabulate the "total population by States . . . as required for the apportionment of Representatives in Congress among the several States." 13 U.S.C. § 141(b).

17. After receiving the Secretary's report, the President is required to "transmit to the Congress a statement showing the whole number of persons in each State . . . and the number of Representatives to which each State would be entitled under an apportionment of the then existing number of Representatives." 2 U.S.C. § 2a(a). The President's statement to Congress historically has incorporated, without modification, the figures reported to him by the Secretary.

18. Upon Congress's receipt of the statement required by 2 U.S.C. § 2a(a), the Clerk of the House of

Representatives is required to "send to the executive of each State a certificate of the number of Representatives to which such State is entitled." 2 U.S.C. § 2a(b).

19. Each State that is entitled to more than one Representative, based upon the certificate transmitted to it by the Clerk of the House of Representatives, must then "establish congressional districts equal in number to the number of Representatives to which it is entitled." 2 U.S.C. § 2c. Representatives "may only be elected from districts so established." *Id.*

20. The constitutional requirement that the decennial census must, for the purpose of apportionment, be an "actual Enumeration" of the population derived by "counting the whole number of persons in each State" precludes the use of sampling to estimate the population. The use of sampling to estimate the population for the purpose of apportionment is also prohibited by the Census Act, 13 U.S.C. § 195.

21. There have been 21 decennial censuses. The first was taken in 1790. In the early days, obtaining an accurate count was difficult, because the population was thinly spread over vast amounts of territory, much of which was unsettled, even hostile. Transportation was slow and often hazardous. Later censuses were handicapped by the civil strife leading up to and including the Civil War and Reconstruction. Massive waves of immigration and internal migrations have at times made the task particularly burdensome. Notwithstanding these and other difficulties, until now, the executive branch officials to whom Congress has entrusted the critical responsibility of obtaining a valid and lawful enumeration of the population for the purpose of apportionment have always established a

program designed to count the entire population. These officials have never before set out to estimate the population through sampling.

22. Before and after the most recent amendment to 13 U.S.C. § 195, in 1976, the Department of Commerce and the Bureau of the Census interpreted the Census Act and the Constitution to prohibit the use of sampling to determine the population for the purpose of apportionment.

23. On June 12, 1997, concerned by indications that Defendants intended to use sampling in lieu of an actual enumeration in the 2000 census, Congress enacted a statute that required the Department of Commerce to provide Congress with a comprehensive written report detailing the Department's plans for the 2000 census, including any use of sampling. 1997 Emergency Supplemental Appropriations Act for Recovery from National Disasters, Pub. L. No. 105-18, 111 Stat. 158, 217 (1997).

24. In July 1997, the Department issued its REPORT TO CONGRESS—THE PLAN FOR CENSUS 2000 (the "Census 2000 Report"). The Census 2000 Report states unequivocally that Defendants' plan includes the use of sampling to determine the population of the United States in the 2000 census for the purpose of apportioning Members of the House of Representatives among the several States. Pursuant to this plan, Defendants will, *inter alia*, (1) use a methodology they refer to as "sampling for nonresponse follow-up," under which Defendants will make a traditional headcount of the people in what they believe to be 90 percent of U.S. households and estimate the number of people in the remaining households; and (2) use a methodology they refer to as "Integrated Coverage Measurement," under

which Defendants will change the census numbers based upon a later, random sample of housing units, employing classifications based, *inter alia*, on race, ethnicity, gender, and age.

25. In July 1997, the Department of Commerce published its *Census 2000 Operational Plan*, which further confirms Defendants' adoption of a program to use sampling in the 2000 decennial census to determine the population of the United States for the purpose of apportionment.

26. On November 26, 1997, President Clinton signed the 1998 Appropriations Act into law. In § 209(a) of the 1998 Appropriations Act, Congress made the following findings:

(1) it is the constitutional duty of the Congress to ensure that the decennial enumeration of the population is conducted in a manner consistent with the Constitution and laws of the United States;

(2) the sole constitutional purpose of the decennial enumeration of the population is the apportionment of Representatives in Congress among the several States;

(3) section 2 of the 14th article of amendment to the Constitution clearly states that Representatives are to be "apportioned among the several States according to their respective numbers, counting the whole number of persons in each State";

(4) article I, section 2, clause 3 of the Constitution clearly requires an "actual Enumeration" of the population, and section 195 of title 13, United States Code, clearly provides "Except for the determination of population for purposes of apportionment of Representatives in Congress among the several

States, the Secretary shall, if he considers it feasible, authorize the use of the statistical method known as 'sampling' in carrying out the provisions of this title.";

(5) the decennial enumeration of the population is one of the most critical constitutional functions our Federal Government performs;

(6) it is essential that the decennial enumeration of the population be as accurate as possible, consistent with the Constitution and laws of the United States;

(7) the use of statistical sampling or statistical adjustment in conjunction with an actual enumeration to carry out the census with respect to any segment of the population poses the risk of an inaccurate, invalid, and unconstitutional census;

(8) the decennial enumeration of the population is a complex and vast undertaking, and if such enumeration is conducted in a manner that does not comply with the requirements of the Constitution or laws of the United States, it would be impracticable for the States to obtain, and the courts of the United States to provide, meaningful relief after such enumeration has been conducted; and

(9) Congress is committed to providing the level of funding that is required to perform the entire range of constitutional census activities, with a particular emphasis on accurately enumerating all individuals who have historically been undercounted, and toward this end, Congress expects —

(A) aggressive and innovative promotion and outreach campaigns in hard-to-count communities;

(B) the hiring of enumerators from within those communities;

(C) continued cooperation with local government on address list development; and

(D) maximized census employment opportunities for individuals seeking to make the transition from welfare to work.

27. Section 209(b) of the 1998 Appropriations Act provides that "[a]ny person aggrieved by the use of any statistical method in violation of the Constitution or any provision of law (other than this Act), in connection with the 2000 or any later decennial census, to determine the population for purposes of apportionment or redistricting of Members in Congress, may in a civil action obtain declaratory, injunctive, and any other appropriate relief against the use of such method." For these purposes, the 1998 Appropriations Act includes among aggrieved persons "(1) any resident of a State whose congressional representation or district could be changed as a result of the use of a statistical method challenged in the civil action; (2) any Representative or Senator in Congress; and (3) either House of Congress." *Id.* at § 209(d).

28. The 1998 Appropriations Act provides that, for purposes of § 209, the Census 2000 Report and the Census 2000 Operational Plan "shall be deemed to constitute final agency action regarding the use of statistical methods in the 2000 decennial census, thus making the question of their use in such census sufficiently concrete and final to now be reviewable in a judicial proceeding." § 209(c)(2).

29. The use of sampling to determine the population for the purpose of apportionment is prohibited by the

Constitution, which requires that an "actual Enumeration" be obtained by "counting the whole number of persons in each State." The use of sampling to determine the population for the purpose of apportionment is also prohibited by the Census Act, enacted by Congress pursuant to its constitutional duty by law to "direct" the manner in which the decennial census is taken.

30. Because Defendants do not plan to make an actual count of the population, there will be no way to gauge after the fact what the result would have been if the census had been taken by the traditional headcount method. Indeed, Defendants have intentionally designed the 2000 census to be a "one-number" census in an effort to prevent any judicial review or post-census remedy. It is highly likely, however, that the use of sampling will alter the result of the census in a manner that affects constitutional reapportionment.

31. The House of Representatives has an important stake in this controversy because the procedures used to conduct the census directly affect the composition of its membership, and because the Constitution vests Congress with the obligation to conduct an "actual Enumeration" of the population every 10 years and to direct the manner in which the census is taken. Defendants' actions will cause direct and concrete injuries to legally cognizable interests of the House that are redressable through the relief sought in this action.

32. Defendants' adoption of a procedure that uses sampling will cause concrete harm by depriving the House of Representatives of the important institutional protections afforded by the constitutional and statutory mandate that an actual count be obtained. The use of sampling creates a substantial risk or likelihood, *inter alia*, (1) that the composition of the House will not

conform to the requirements of the Constitution and laws in the next decade; (2) that there will be a successful legal challenge to the apportionment that could disrupt the House's operations as a body; (3) that the public will not have confidence in census numbers derived from estimates, which will undermine public respect for the House; and (4) that the census numbers could be politically manipulated to alter the composition of the House.

33. Defendants' adoption of a procedure that uses sampling will also cause concrete harm to the House of Representatives by preventing it from fulfilling the constitutional and statutory duty imposed upon Congress to conduct the census and ensure that the House can be timely apportioned in accordance with law. Defendants' decision to abandon the traditional and required method for conducting the census will prevent the House from receiving the population numbers it must have to perform its mandate to effectuate the lawful reapportionment of the House. This suit is necessary, and specifically authorized by law, to vindicate the special authority of Congress to direct the manner in which the census is taken, and to prevent Defendants from undermining that authority by disregarding congressional direction.

34. Defendants' adoption of a procedure that uses sampling may cause a conflict between (1) the statutory duty of the Clerk of the House of Representatives (as an officer of the House subject to its direction and control) to transmit to the States the President's statement showing the "whole number of persons in each State" and the number of Representatives to which each State is entitled, and (2) the constitutional duty of the House to ensure that the census and

ensuing reapportionment is conducted in accordance with the Constitution and laws of the United States. In the absence of injunctive or declaratory relief from this Court, the House may be forced to violate one of these legal duties.

35. Congress recognized the particularized interest of the House of Representatives in ensuring a valid and constitutional decennial census by providing in § 209(d) of the 1998 Appropriations Act that the House is a party aggrieved by the use of any statistical method in violation of the Constitution or laws of the United States to determine the population for the purpose of apportionment, with a right to seek in a civil action declaratory, injunctive, or other appropriate relief against the use of such method.

36. As the Congress found in § 209(a)(8) of the 1998 Appropriations Act, "the decennial enumeration of the population is a complex and vast undertaking, and if such enumeration is conducted in a manner that does not comply with the requirements of the Constitution or laws of the United States, it would be impracticable for the States to obtain, and the courts of the United States to provide, meaningful relief after such enumeration has been conducted."

37. Recognizing that there is a substantial public interest in insuring through a prompt and final declaration of rights that the population determination resulting from the 2000 census—which is projected to cost nearly $4 billion—will lawfully form the basis for apportionment over the course of the ensuing decade, Congress provided for expedited litigation of this matter. *See* 1998 Appropriations Act, § 209(e).

COUNT ONE

38. Plaintiff United States House of Representatives repeats and realleges the allegations of paragraphs 1 through 37 of the complaint.

39. Defendants have adopted a program for the 2000 census that uses sampling, *inter alia*, for nonresponse follow-up and Integrated Coverage Measurement, in lieu of relying upon an actual count of the people of the United States, to determine the population for the purpose of apportioning Members of the House of Representatives among the several States.

40. The use of sampling in the decennial census to determine the population for the purpose of apportioning Members of the House of Representatives among the several States violates the Constitution and the Census Act.

41. The House of Representatives is aggrieved by Defendants' program to use sampling in the 2000 decennial census in violation of the Constitution and laws of the United States. Defendants' actions will cause direct and concrete injuries to legally cognizable interests of the House that are redressable through the relief sought in this action.

42. Newt Gingrich, the Speaker of the House of Representatives, has directed the commencement of this suit by the House of Representatives, in accordance with § 209(g) of the 1998 Appropriations Act.

43. The issuance of declaratory and injunctive relief is necessary to prevent irreparable injury to the House of Representatives.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff United States House of Representatives prays that:

a. The Court convene a three-judge panel to hear and determine this case pursuant to § 209(e)(1) of the 1998 Appropriations Act;

b. The Court declare that Defendants' use of sampling for nonresponse follow-up, for Integrated Coverage Measurement, or in any other way, in the 2000 census to determine the population for the purpose of apportioning Representatives among the several States would violate Article I, § 2, cl. 3, and Section 2 of the Fourteenth Amendment to the United States Constitution;

c. The Court declare that Defendants' use of sampling for nonresponse follow-up, for Integrated Coverage Measurement, or in any other way, in the 2000 census to determine the population for the purpose of apportioning Representatives among the several States would violate the Census Act, 13 U.S.C. §§ 1 *et seq.*;

d. The Court permanently enjoin Defendants from using sampling for nonresponse follow-up, for Integrated Coverage Measurement, or in any other way, in the 2000 census to determine the population for the purpose of apportioning Representatives among the several States; and

e. The Court award to Plaintiff such additional and further relief as the Court deems appropriate.

Respectfully submitted this 20th day of February, 1998,

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United States Department of Commerce

Bureau of the Census

STATUS REPORT ON PLANNING FOR A DECENNIAL CENSUS IN YEAR 2000 WITHOUT THE USE OF SCIENTIFIC SAMPLING

AS OF APRIL 1998

* * * * *

VIII. PLANNING SCHEDULE FOR ALTERNATIVE PLAN FOR CENSUS IN 2000

Integral to the Census Bureau's work to develop a detailed plan for an alternative plan census by December 1998 is formulating a budget for the remaining years of the 2000 census cycle, and completing an Operational Plan incorporating all activities in the revised plan. Until the Bureau has selected and defined new or expanded components and performed the operational analyses needed to determine their staffing, equipment, and timing requirements, meaningful cost estimates and time lines for activities cannot be provided.

With few exceptions, virtually every census activity in the current design for 2000 is subject to modification for the non-sampling census design. Costs of only a few large pre-and post-census operations (compilation of the initial Master Address File, associated geographic services, and dissemination of finally results) are unlikely to change. Virtually all other operations-whether they are adaptations of activities conducted in 1990, or have been developed as part of planning the sampling design, or would be newly defined-require reexamination under the non-sampling plan. They may have greater work loads with increased staffing, timing, and equipment or supply requirements; they may introduce work flow modifications with implications for schedule and personnel resources; and they may entail major redesign of forms or other materials. Furthermore, it is not sufficient to define requirements for each individual component; relationships within the full set of components must be determined to assure

that time and cost estimates reflect an efficient work-flow and use of resources. For example:

- It would likely be necessary to restructure the entire set of operations during the critical period between the delivery of census questionnaires and the beginning of nonresponse follow up. If, for instance, the Census Bureau decides to do a second, targeted mailing of the census questionnaire, that time period would be lengthened and additional census forms would be required. If, in addition, they introduce an early enumeration of units identified as vacant by the USPS, both changes must be incorporated into a revised schedule supported by appropriate levels of staff resources.
- Because all nonresponding addresses would be visited, the follow up period must be expanded, additional questionnaires and other supplies must be produced, and the work load for data capture would be increased. The Census Bureau would have to examine the new work flow to determine if peak processing periods would require additional automated equipment and staffing.
- Many operations targeted at improving coverage would require new forms and procedures. First and foremost, those operations which depend on information on the census questionnaire imply revisions to the questionnaire's format and potential changes in size. Also, new telephone or field follow up operations-for example, if administrative records are used to identify persons potentially missing from the census-would require new forms, interviewer training and procedures, and supervisory requirements.

- New requirements for matching and unduplication activities may include expanding the search area and preparing materials for telephone or field verification in some cases. The implications of these new requirements, which may require schedule changes, additional clerical support, or the like, would be examined before associating time lines and costs with the operation.

Nov 1997	Funding of FY 1998 approved, including requirements to develop traditional plan by March 1999.
April 1998	Present status report on planning for an alternative design
May - Oct 1998	Assess effectiveness and costs of major elements of alternative plan, while working with Congress to clarify its willingness to spend substantial additional funds to reduce inaccuracy
Oct 1998	Open 130 Local Census Offices and begin training and preparing office staff to implement the plan
Dec 1998	Provide results from the dress rehearsals
Jan 1999	Provide analysis of the dress rehearsals
March 1999	Act on final decision on scientific sampling in Census 2000.

* * * * *

(ORDER LIST: 524 U.S.)

THURSDAY, SEPTEMBER 10, 1998

APPEAL—JURISDICTION NOTED

98-404 DEPARTMENT OF COMMERCE, ET AL. V. UNITED STATES HOUSE OF REPRESENTATIVES, ET AL.

The motion of the parties to expedite consideration and to expedite the briefing schedule is granted. In this case probable jurisdiction is noted. The briefs of the appellants and intervenor-defendants are to be filed with the Clerk and served upon opposing counsel on or before 3 p.m., Tuesday, October 6, 1998. The briefs of appellees are to be filed with the Clerk and served upon opposing counsel on or before 3 p.m., Tuesday, November 3, 1998. The reply briefs, if any, are to be filed with the Clerk and served upon opposing counsel on or before 3 p.m., Tuesday, November 17, 1998. Rule 29.2 does not apply. Oral argument is set for Monday, November 30, 1998.

United States Department of Commerce

Bureau of the Census

REPORT TO CONGRESS—

THE PLAN FOR CENSUS 2000

Originally Issued
July 1997

Revised and Reissued
August 1997

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This Report was required by Title VIII of P.L. 105-18. For ease of reference, readers can find the following specifically-requested items in the following locations:

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"an explanation of these statistical methodologies"	II(B); IV; V
"a list of statistical errors which may occur as a resultof the use of each statistical methodology"	VIII
"the estimated error rate down to the census tract level"	VIII(E)
"cost estimation showing cost allocations for each censusactivity planned"	III
"an analysis of all available options for counting hard-to-enumerate individuals, without utilizing sampling or any other statistical methodology, including efforts like the Milwaukee Complete Count Project"	VI; VII
"an estimate of the error rate at the census block levelbased upon the 1995 test data"	VIII(F)

EXECUTIVE SUMMARY

This "Report to Congress—The Plan for Census 2000" responds to Congress' direction that the Department of Commerce provide it with a comprehensive and detailed plan for Census 2000, including methodologies, types and size of statistical errors, cost estimates, options for counting hard-to-enumerate individuals without statistical sampling, and error rates at the census block level in the 1995 test.

The Census Bureau's goal in Census 2000 is to take the most accurate and cost-effective census possible. The importance of an accurate decennial census cannot be overstated. Census data are used to reapportion the House of Representatives, ensuring that political representation is distributed evenly to all Americans, and to determine allocation formulas for the distribution of billions of dollars of federal and state funds each year. Census data tell us what we know about our country; they are the definitive benchmark for virtually all demographic information used by educators, policy makers, journalists, and community and nonprofit organizations.

The national census count became more accurate with each consecutive census from 1940 to 1980. Although it surpassed all previous censuses in terms of design, execution and resources used, the 1990 census took a large step backwards in terms of accuracy. While the 1980 census had fallen 2.8 million people below an accurate count, the census count in 1990 fell 4.7 million people short, missing 1.8 percent of the population, according to demographic analysis estimates.

Moreover, the undercount in 1990 was not spread evenly across the nation; children and minorities were disproportionately undercounted.

In the wake of the 1990 census, there was a consensus among the Census Bureau, professional statisticians, and Congress that significant changes were required for the upcoming 2000 census; the Census Bureau could not continue to employ the methods it had been using. In 1991, bipartisan legislation passed unanimously by Congress and signed by President Bush directed the National Academy of Sciences (the Academy) to study "the means by which the Government could achieve the most accurate population count possible."

Changes in American society dictate that census-taking methods must change. The willingness of many Americans to respond to the decennial census has declined in recent years. Populations with high undercount rates under traditional methods of enumeration have grown more rapidly than the total population. The necessity of adapting census methodologies in response to societal changes was discussed by the Academy Panel to Evaluate Alternative Census Methodologies in its second interim report in June 1997: "[c]hange is not the enemy of an accurate and useful census; rather, not changing methods as the United States changes would inevitably result in a seriously degraded census."

Census 2000 will incorporate many changes. It will incorporate a Master Address File that is more comprehensive than ever. It will use a public outreach and marketing campaign to educate people about the importance of being counted. It will utilize a more effective questionnaire mailout and mailback cam-

paign—the foundation of the census. It will incorporate advanced technologies to increase accuracy and speed. It will utilize statistical sampling to account for those who cannot otherwise be accounted for. And it will incorporate quality assurance plans to ensure an accurate one-number census. The details of the plan for Census 2000 are contained in this Report.

The Academy recommended that the Census Bureau consider "the appropriateness of using sampling methods in combination with basic data-collection techniques." As detailed in this Report, several Academy panels have examined the census process over the past six years and all have concluded that an accurate and cost-effective census cannot be taken without the introduction of a limited use of sampling. The Academy Panel on Census Requirements in the Year 2000 and Beyond concluded that,

> [i]t is fruitless to continue trying to count every last person with traditional census methods of physical enumeration. Simply providing additional funds to enable the Census Bureau to carry out the 2000 census using traditional methods, as it has in previous censuses, will not lead to improved coverage or data quality.

The Plan for Census 2000 results directly from the 1991 legislation and the subsequent guidelines and recommendations of the Academy. All significant departures from the methodologies used in previous censuses have been endorsed by the Academy, the Bureau's advisory committees, and the scientific community.

The Plan for Census 2000 has received strong support from professional statisticians and demographers—experts are convinced that the introduction of a limited

use of scientific sampling in Census 2000 will result in a more accurate, less costly census. These experts also believe that the use of sampling in Census 2000 should minimize the opportunity for political manipulation, not increase it. Scientists understand that sampling has known, objective properties that are preferable to the certainty of missing several million individuals using traditional enumeration methods alone. They understand that uncontrolled error is more of a concern with a traditional headcount than with sampling.

Outreach efforts, like the City of Milwaukee's Complete Count Campaign in 1990, increase awareness and mail response rates, but do not solve the census accuracy problem. The alternative to introducing a limited use of sampling is to continue with traditional physical enumeration methods. Taking Census 2000 the same way that the 1990 census was taken would result in an expected undercount of at least 1.9 percent of the population (more than 5 million people), and would cost at least $675 million more than the current plan. Increased outreach will not solve the problem; spending more money for less accuracy is not a feasible alternative.

To further ensure accuracy and to avoid even the appearance of possible manipulation of the census, the Census Bureau has made plans for Census 2000 to incorporate an unprecedented expert review process. The Census Bureau has proposed that the Academy convene another expert panel to guide the Bureau's work through the completion of Census 2000. This new group will review critically the statistical procedures for Census 2000, especially the use of statistical sampling. The new group will work closely with the statisticians and demographers at the Census Bureau

through the entire census operation. Census 2000 will be conducted in the open, in full public view.

As requested, this Report details expected error rates for Census 2000 down to the census tract level. If Census 2000 is conducted using a traditional enumeration, without the introduction of sampling, the Census Bureau expects an average error rate of at least 1.9 percent at all levels of geography from the census tract level up to the national level. In contrast, the Census Bureau's plan for Census 2000, a plan involving the introduction of a limited use of sampling, has the following expected average error rates: 0.1 percent at the national level, 0.5 percent at the state level, 0.6 percent at the Congressional district level, and 1.1 percent at the tract level.

The Report also discusses error rates at the census block level. The 1995 Census Test did not provide meaningful error rates at the block level. The block error rates measured in the 1995 Census Test reflect two facts, that the test had lower rates of sampling than will be used in Census 2000, and that some blocks had few people. Even traditional methods of enumeration have seemingly high block level error rates: the 1990 Census had an average block error rate of almost eight percent. Fortunately, with or without sampling, such substantial error at the census block level does not mean substantial inaccuracy when blocks are aggregated. At all geographic levels important to political representation and funds allocation, Census 2000 will provide more accurate results than physical enumeration alone.

The Census Bureau is confident that its plan for Census 2000 satisfies both the Census Act and the Constitution.

The Department of Justice (DOJ) in 1994 specifically approved the Census Bureau's plan to use sampling in Census 2000, a position consistent with earlier DOJ opinions in prior administrations, both Democratic and Republican. Courts have interpreted the Constitutional requirement of an "actual Enumeration" as a command to take the most accurate census feasible. Due to changes in American society, the most accurate census feasible can no longer be taken by traditional physical enumeration methods alone. The introduction of a limited use of sampling is necessary for an accurate and cost-effective census in 2000.

I. IMPORTANCE OF AN ACCURATE CENSUS

The Constitution commands that a census of the nation's population be taken every ten years. The constitutional purpose for the census is the apportionment of seats in Congress, but the information collected every ten years provides more than just state-by-state population totals. The decennial census provides the cornerstone of knowledge about the people of our nation.

State and local governments use census data to draw legislative districts of equal population to comply with the constitutional "one man, one vote" mandate, and to comply with the statutory requirements of the Voting Rights Act. Each year the Federal government distributes billions of dollars in grants according to population-based formulas based on census data. Federal, tribal, state and local officials study the patterns of detailed census data before constructing hospitals, highways, bridges and schools. Private businesses large and small have come to depend on the Census Bureau's population, income, education and housing data to locate new offices, shops and factories, and to market new products. Census data also serve as definitive benchmarks for virtually every household survey by educators, policy-making agencies, and community and nonprofit organizations.

A. A Tradition of Innovation in the Census

The first census was taken in 1790 by United States Marshals, who were directed to visit every dwelling place and count the individuals living there. Since that time, the census has evolved to accommodate societal

changes and to use advances in technology and statistics.

- The nation's population grew faster than the number of U.S. Marshals. Over time, professional enumerators supplemented the work of Marshals and completely replaced them by the end of the 19th century.

- After spending eight years tallying by hand the results of the 1880 Census, Census Bureau employees invented the punch card machine.

- In 1940, the Census Bureau introduced its "short form" questionnaire for the majority of the population, using the "long form" set of questions for only a sample of the population. Prior censuses had asked all residents to answer all questions.

- In 1970, the Census Bureau introduced self enumeration by mail. Rather than send an enumerator to every household in the nation, the Census Bureau first mailed questionnaires for households to fill out and mail back, and then sent enumerators only to nonresponding addresses.

The basic structure for census data collection (mailout/mailback followed by enumerator visits to all nonresponding addresses) did not change from 1970 through 1990. The results of the 1990 Census, however, demonstrated that new methods are required.

B. Lessons From the 1990 Census

1. Overview. The 1990 Census was a difficult undertaking. Though better designed and executed than any previous census, the Census in 1990 took a

step backward on the fundamental issue of accuracy. For the first time since the Census Bureau began conducting post-census evaluations in 1940, the decennial census was *less* accurate than its predecessor. In spite of unprecedented efforts to count everyone, accuracy in the 1990 Census fell short of the accuracy achieved in the 1980 Census. On the basis of "Demographic Analysis,"[1] the undercount was 4.7 million people; the undercount rate of 1.8 percent in 1990 was 50 percent greater than the rate had been in 1980.

(Net Undercount Based on Demographis Analysis, 1940-1990 – Chart Omitted)

2. Some Groups Counted Less Effectively Than Others. To measure the extent to which identifiable groups were not fully counted, the Census Bureau conducted a Post Enumeration Survey (PES)[2] as part of the 1990 Census process. The PES found large differences in the undercount rates for different groups, a phenomenon called the "differential undercount."

Children were much more likely than adults to be undercounted in the 1990 Census. While children

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[1] Demographic Analysis is one of the two standard methods that the Census Bureau uses to measure coverage, that is the extent that the official census totals cover or completely account for the true total. Demographic Analysis relies on administrative records of births, deaths, immigration, and emigration to provide estimates of the true total. Demographic Analysis is the only method for analyzing historical trends in the shortfall in coverage, the national undercount.

[2] The PES evaluated coverage on a case-by-case basis using the Dual System Estimation methodology explained in Section V (F). The PES provided undercount information for detailed categories, such as renter/homeowner and racial and ethnic group, that are not possible with demographic analysis.

under the age of 18 represented 26 percent of the total national population that year, they accounted for 52 percent of the undercount.

(Children's Share – Chart Omitted)

Renters, particularly in rural areas, were also more likely to be left out of the official Census count in 1990. The PES found a 5.9 percent undercount among renters in rural areas.

(Undercount of Homeowners and Renters – Chart Omitted)

Racial and ethnic minorities were also affected disproportionately. Compared to the undercount rate for non-Hispanic Whites, the 1990 undercount rates were six times larger among African Americans and seven times larger among Hispanics. Twelve percent, or nearly one out of every eight, American Indians living on reservations were not counted in 1990.

(Estimated 1990 Census Net Undercount Percent – Chart Omitted)

3. Effects of Inaccuracy. As a result of the inaccuracy in the 1990 Census, many Americans were denied an equal voice in their government. Federal spending employing population-based formulas—for schools, crime prevention, health care, and transportation— was misdirected.

4. An Exhaustive Attempt to Make Traditional Methods Work. The 1990 Census failed to match the accuracy of the 1980 Census despite the Census Bureau's exhaustive attempt to make traditional methods work. The Census Bureau deployed more than a half million people around the country to collect

information from the approximately 36 million addresses that had not responded by mail. The Bureau devoted considerable effort and resources on operations to improve the count in areas with the greatest risk of a large undercount:

- Four advisory committees helped develop and implement specialized outreach efforts to racial and ethnic minority groups.

- To promote awareness about the census and its importance, the Census Bureau invested $75 million in promotion and outreach activities, and worked with the Advertising Council on a public service announcement campaign valued at $68 million.

- Toll free telephone numbers were created so that people who had questions about how to fill out the forms could get assistance or request a Spanish-language form.

5. **Resources Were Adequate**. The deterioration in accuracy of the census from 1980 to 1990 cannot be attributed to inadequate funding by Congress. The Census Bureau requested, and received, additional appropriations from Congress. The 1990 Census was the most expensive in history, costing $25 per housing unit. On an inflation adjusted basis, the 1970 Census had cost only $11 per housing unit, and the 1980 Census $20 per housing unit.

(Rising Census Cost – Chart Omitted)

6. **Causes of Inaccuracy and the Undercount**. How did such a comprehensive effort result in the first count known to be *less* accurate than its predecessor? Experts at the Census Bureau and three National

Academy of Sciences (Academy) panels commissioned to study the problem concluded that the lower accuracy and higher costs of the 1990 Census were the product of several troubling societal trends:

- An increasing number of Americans were too busy to be counted. The number of people working more than one job had increased, along with the number of multiple-worker families, so people were home less often when enumerators visited. When people were home, they were less willing to spend time filling out a census form.

- Americans were inundated with junk mail, mail that obscures important documents such as census forms.

- More Americans lived in housing that was remote or inaccessible. For example, security guards in gated communities did not always cooperate with enumerators.

- More Americans were becoming alienated from society in general and more mistrustful of government in particular. They had also grown more concerned about privacy.

These experts also concluded that the population of people more likely to be left uncounted has been growing more rapidly than the total population. Census tracts with high undercount rates tend to have the following characteristics to a greater degree than the rest of the country:

- A highly mobile population.

- Language barriers.

- High concentrations of unmarried residents.

- Nontraditional housing arrangements, such as extended families, cohabiting couples, roommates, boarders and other nonrelatives.

- Irregular housing, such as illegal units, mobile homes and secured buildings.

- Neighborhood conditions that lead to resistance to outsiders, concealment to protect resources, and disbelief of census confidentiality.

Because higher proportions of the nation's children, renters, and minorities live in these situations, it should not be surprising that their undercount rates are higher.

The sharp decline in the rate that people return their census questionnaires presents a clear example of how the changes in society directly affect the operation of the census. When census questionnaires were first mailed in 1970, 78 percent of housing units mailed back their questionnaires. By 1990, that percentage had fallen to 65 percent.

Every indication since 1990 suggests that the census-taking environment is likely to be even more difficult in 2000 than it was in 1990. For example, the percentage of married couple families with both spouses employed rose steadily from 28 percent in the 1960 Census to 50 percent in the 1990 Census. That trend has continued upward in the 1990s.

C. A Consensus to Improve Census Accuracy

Congress, concerned about the accuracy and cost problems of the 1990 Census, passed the Decennial Census Improvement Act of 1991 (P.L. 102-135), signed by President Bush, requiring the National Academy of Sciences to study "the means by which the Government could achieve the most accurate population count possible," specifically considering, *inter alia*, "the appropriateness of using sampling methods in combination with basic data-collection techniques or otherwise, in the acquisition or refinement of population data, including a review of the accuracy of the data for different levels of geography . . ." The legislation enjoyed bipartisan support: the House of Representatives passed it unanimously and the Senate passed it under a suspension of the rules by unanimous consent.

D. Recommendations of National Academy of Sciences' Panels

Since 1990, the Academy's Committee on National Statistics has established three separate panels to study how to improve the next decennial census: the Panel on Census Requirements in the Year 2000 and Beyond ("Academy Panel on Requirements"), the Panel to Evaluate Alternative Census Methods ("Academy Panel on Methods"), and the Academy Panel to Evaluate Alternative Census Methodologies ("Academy Panel on Alternative Methodologies").[3]

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[3] The Academy Panel on Requirements was tasked with considering the purposes of a decennial census and alternative data collection systems. This panel supplemented an existing panel, the Academy Panel on Methods that had been tasked with studying

The Academy Panel on Requirements found that traditional methods were incapable of eliminating the undercount:

> It is fruitless to continue trying to count every last person with traditional Census methods of physical enumeration. Simply providing additional funds to enable the Census Bureau to carry out the 2000 Census using traditional methods, as it has in previous Censuses, will not lead to improved coverage or data quality.

It also found that more radical alternatives to a traditional enumeration (a national register, an administrative records census, a census conducted by the U.S. Postal Service, and a rolling sample census) were either not feasible or not consistent with American values.

Finally, the Academy Panel on Requirements found that scientific sampling, both for nonresponse follow-up and to improve accuracy (each is described in Section V) would both increase accuracy and lower costs. That panel concluded that scientific sampling was not just *a* solution to the cost and accuracy problems, it was the *only* solution.

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how the census should be taken and that focused on more specific methodologies. The Academy Panel on Requirements issued an interim report in May, 1993 and its final report, "Modernizing the U.S. Census," in 1995. The Academy Panel on Methods issued a "Letter" report in December, 1992, an interim report in September, 1993, and its final report, "Counting People in the Information Age," in the fall of 1994. Subsequently, the Academy created its Academy Panel on Alternative Methodologies, which has issued two interim reports: "Sampling in the 2000 Census: Interim Report I," in June, 1996, and "Preparing for the 2000 Census: Interim Report II," in June, 1997.

The report from the Academy Panel on Methods concurred with the Academy Panel on Requirements that statistical sampling should be used both for nonresponse follow-up and to increase accuracy:

> Differential undercount cannot be reduced to acceptable levels at acceptable costs without the use of integrated coverage measurement and the statistical methods associated with it. We endorse the use of integrated coverage measurement as an essential part of Census-taking in the 2000 Census . . . Sampling for nonresponse follow-up could produce major cost savings in 2000. The Census Bureau should test nonresponse follow-up sampling in 1995 . . .

The Second Interim Report from the Academy Panel on Alternative Census Methodologies likewise concluded that census methods need to change in response to societal changes:

> Changing, updating, and adapting the Census methods is a proven and desirable course of action. Change is not the enemy of an accurate and useful Census; rather, not changing methods as the United States changes would inevitably result in a seriously degraded Census.

Thus, the current plan for Census 2000 results from Congressional legislation, enacted in the aftermath of the 1990 Census, that directed the Census Bureau to achieve greater accuracy by revising census methodology in accordance with recommendations formulated by the National Academy of Sciences.

II. THE CENSUS 2000 PLAN

Census 2000 will be the largest peacetime mobilization in our nation's history. Its goal is to ensure that every individual in the United States on April 1, 2000 is accounted for.

A. Public and Congressional Involvement in Census 2000 Planning

1. **The Advisory Committees.** To ensure public involvement in the plan for Census 2000, the Bureau chartered a number of advisory committees under the Federal Advisory Committee Act, 5 U.S.C. § App. I, to assist in planning.

- **The 2000 Census Advisory Committee** consists of more than 30 professional, governmental, and nongovernmental organizations, such as the American Sociological Association, the Business Roundtable, the National Association of Counties, the National Governors' Association, the U.S. Chamber of Commerce, and the National Coalition for the Homeless. All Congressional oversight committees and subcommittees have had *ex officio* members on this Advisory Committee. The Committee advises the Secretary of Commerce about designing Census 2000 methodologies and procedures, reducing the differentials among population groups and geographic areas, and containing costs.

- **The Census Advisory Committee of Professional Associations** consists of the American Statistical Association, the Population Association of America, the American Economic Association, and the American Marketing Association. The Committee advises the Census Bureau on the full

range of Census Bureau programs and activities in relation to its areas of expertise.

- **Four Census Advisory Committees on Particular Racial and Ethnic Populations** have been created: the **Census Advisory Committee on the African American Population**; the **Census Advisory Committee on the American Indian and Alaska Native Populations**; the **Census Advisory Committee on the Asian and Pacific Islander Populations**; and **the Census Advisory Committee on the Hispanic Population**. These four Committees provide the Census Bureau with an organized and continuing channel of communication with the communities they represent. They have helped the Census Bureau refine plans for nonresponse follow-up sampling, the paid advertising campaign, community-based outreach programs, and other matters critical to reaching all segments of the nation's population.

2. **Public Meetings.** To ensure even wider participation in the planning process, the Census Bureau has convened public meetings in thirty-one cities across the country over the past three years to solicit input on the plan for Census 2000.

3. **Congressional Partnership.** In recognition of the Congress' particular interest in the decennial census, the Department of Commerce and the Census Bureau have strived to keep Congress informed about plans for improving Census 2000. Since the inception of the Secretary's 2000 Census Advisory Committee, the Chairman and ranking member of the House and Senate authorizing and appropriations committees and subcommittees have served as *ex officio* members of the Committee. Census Bureau staff cooperated with

the Congress to develop P.L. 103-430, the Census Address List Improvement Act of 1994, that will enable effective partnerships with local and tribal governments, as well as with the U.S. Postal Service (USPS).

Since 1991, Department of Commerce officials have accepted 18 invitations to testify before House and Senate authorizing committees. In addition, officials have accepted invitations to testify before the House Appropriations Committee and the Senate Appropriations Committee. In the past two years, officials have responded to nearly 100 Congressional letters and more than 75 telephone requests inquiring about the plan for Census 2000. During that same period, the Census Bureau's Director and other Department of Commerce officials have held more than 100 briefings for Members and their staff on the plan for Census 2000.

B. Major Components of the Plan

The Census Bureau's detailed plan for Census 2000 is set forth in "The Census 2000 Operational Plan", a copy of which is appended to this report. The highlights of the plan are explained below and in Sections IV and V.

1. The Master Address File. To conduct the census, the Census Bureau must identify and locate an estimated 118 million housing units in the nation. It plans to accomplish this goal by developing and maintaining a Master Address File (MAF) that is more comprehensive than ever before. For more detail on the MAF, see Section IV(A).

2. Public Outreach and Marketing. In 1990, the Bureau spent approximately $75 million on promotion and outreach. It also supported a Public Service Announcement (PSA) effort that resulted in the airing of approximately $68 million worth of donated adver-

tisements. In spite of these efforts, the mail response rate dropped 10 percentage points and, according to Demographic Analysis, the net undercount was almost 2 million people higher than in the 1980 Census.

Part of this drop was caused by the Census Bureau's inability to ensure that PSAs were broadcast at optimum times and in appropriate markets. An evaluation of the 1990 PSA campaign by an outside contractor noted that ads were seldom placed at optimal times because decisions about when to air PSAs rested with local radio or television stations. Sixty percent of the U.S. population received 91 percent of the census advertising impact; forty percent received only 9 percent.

Post-census analysis found that outreach and publicity appeared to improve response and seemed as successful or more successful in 1990 than in 1980. However, the 1990 Outreach Evaluation Survey also revealed that outreach was less successful among Blacks than among non-Hispanic Whites or Hispanics.

Based on its study of prior outreach campaigns, the Bureau concluded that the professional control of a paid media campaign would produce the best results. As former Director of the Census Bureau, Dr. Barbara Bryant (1989-1993) noted, "[t]he time for dependence upon pro bono creative work on Public Service Announcements for air time was past by 1990. The Census Bureau depended upon these for one census too many."

Census 2000 will launch a $208 million public out-reach campaign to educate everyone about the importance of

being counted. Among the improvements in public outreach and marketing are:

Targeted community outreach. In 2000, the Census Bureau will build partnerships with local and tribal governments, businesses, and community groups to get the word out, to endorse the census, and to encourage constituents to respond. Beginning in 1996 and expanding in 1998, government and community specialists will be hired to build relationships with local community and service-based organizations— focussing on groups representing traditionally undercounted populations. An extensive outreach program is planned to reach schools, public sector employees, American Indians, and religious organizations. Businesses, non-profit groups, and labor organizations will also be asked to endorse participation and to publicize the census through employee newsletters, inserts with paychecks, and through communications with members and local chapters.

Direct mail. The census questionnaire and related materials delivered to individual addresses will carry the same themes and messages as the overall campaign.

Public relations. The Bureau will use public meetings and the news media to inform the public about the value of the census and to encourage response. Communications specialists will be assigned to each field office to perform media outreach, to respond to media inquiries, and to coordinate the dissemination of Census 2000 messages. Local broadcaster/news director committees will be established in many communities to emphasize Census 2000 to TV viewers and radio listeners through broadcast segments and editorials in newspapers.

Advertising. The Census Bureau plans a targeted campaign to reach everyone through ads in newspapers, magazines, billboards, posters, radio, and television. A qualified private advertising firm will be retained to design and implement the Census 2000 advertising campaign at a projected cost of approximately $100 million, primarily for buying media time.

3. Questionnaire Mailout/Mailback. In Census 2000, the questionnaire mailout/mailback system will be the primary means of census-taking, as it has been since 1970. The short form will be delivered to approximately 83 percent of all housing units. The short form asks only the basic population and housing questions, while the long form will include additional questions on the characteristics of each person and of the housing unit. The long form will be delivered to a sample of approximately 17 percent of all housing units.

USPS letter carriers will deliver questionnaires to the vast majority of housing units that have city-style addresses (*e.g.*, 123 Main Street, Anytown, USA). In areas where there is no USPS delivery to city-style addresses, enumerators will hand-deliver addressed census questionnaires to each housing unit. In very remote or sparsely populated areas, enumerators will visit each housing unit and pick up or complete unaddressed questionnaires that the USPS previously delivered to each unit.

Because the American public is now deluged with junk mail, the Census Bureau has developed a questionnaire for 2000 that is easy to read, pleasing to look at, and simple to fill out. Private marketing experts are working with the Bureau to develop user-friendly designs that will help people understand why they are

being asked for information. Sections IV(B) and IV(C) details innovations in the data collection process.

4. Collecting Data on Populations Living In Non-traditional Households. Taking a decennial census does not involve counting people just living in houses and apartments. In Census 2000, the Census Bureau must also enumerate people who live in group quarters and other nontraditional housing units, as well as people with no usual residence. These units include nursing homes, group homes, college dormitories, migrant and seasonal farm worker camps, military barracks or installations, American Indian reservations, and remote areas in Alaska.

Some of the enumeration methods that will be used for these special populations are:

- The Census Bureau has designed an operation for Census 2000 called Service-Based Enumeration (SBE) to improve the count of individuals who might not be included through standard enumeration methods. The SBE operation will be conducted in selected service locations, such as shelters and soup kitchens, and at targeted outdoor locations.

- Another special operation will count highly transient individuals living at recreational vehicle campgrounds and parks, commercial or public campgrounds, marinas, and even workers' quarters at fairs and carnivals.

- The Census Bureau is working with tribal officials to select the appropriate data collection methodologies for American Indian reservations.

- Remote areas of Alaska, often accessible only by small airplanes, snowmobiles, four-wheel-drive vehicles, or dogsleds, will be enumerated beginning in mid-February. This special timing will permit travel to these areas while conditions are most favorable.

- The Bureau will work with the Department of Defense and the U.S. Coast Guard to count individuals living on military installations, and with the U.S. Maritime Administration to identify maritime vessels for enumeration.

5. Collecting Long Form Data to Meet Federal Requirements. The census is the only data-gathering effort that collects the same information from enough people to get comparable data for every geographic area in the United States. The long form has been used on a sample basis since 1940 to collect more data, more rapidly, while reducing overall respondent burden. In 2000, the long form will ask questions addressing the same seven subjects that appear on the short form, plus an additional 27 subjects which are either specifically required by law to be included in the census or are required in order to implement other federal programs and the census is the only source of the data.

6. Retrieving and Processing the Data from the Returned Forms. The Census Bureau has contracted with the private sector to secure the best available data capture technology. This technology will allow the Census Bureau to control, manage and process Census 2000 data more efficiently.

The Census 2000 data processing system will be a complex network of operational controls and processing routines intended to store and service the decennial

control and data requirements. The Bureau will record a full electronic image of every questionnaire; sort mail-return questionnaires automatically; use optical mark recognition for all check-box items; and use intelligent character recognition to capture write-in character-based data items. The system will allow the Bureau to reduce the logistical burdens associated with handling large volumes of paper questionnaires. Once forms are checked in, prepared and scanned, all subsequent operations will be accomplished using the electronic image and captured data.

7. Matching and Unduplication. Census 2000 will make it simpler for people to be counted by providing them with multiple opportunities, and multiple methods, to respond. These response options will make it easier for everyone to be counted, but will increase the possibility of multiple responses for a given person and/or household. Unduplication of multiple responses in past censuses would have required a massive clerical operation, since only a small subset of person names was data captured. Advances in computer technology in the areas of computer storage, retrieval, and matching, along with image capture and recognition, have now given the Census Bureau the flexibility to provide multiple response options without incurring undue risk to the accuracy of the resulting census data.

8. Processing. The electronic images and data will be edited by computerized routines, checked for completeness and consistency, and prepared for tabulation and release of totals. As part of this process, missing information will be imputed.

9. Quality Assurance. To detect, correct, and minimize performance errors in critical census operations, the

Census Bureau has developed individual quality assurance plans for all activities that could contribute to errors in outcome, such as misprinted census forms, inaccurate maps or address lists, faulty intelligent character recognition, inadequate training of enumerators, and mis-keyed entries. The Census Bureau has created Quality Assurance Plans for each significant activity in Census 2000. In most cases, the Census Bureau will perform back-up checks for each procedure. Errors will be corrected, and steps will be taken to prevent similar errors in the future.

10. The Census 2000 Dress Rehearsal in 1998. A good dress rehearsal is crucial to a successful Census 2000, and the key to any dress rehearsal is making it as much like the actual event as possible. The Census Bureau has selected three sites in which to conduct the Census 2000 Dress Rehearsal: Sacramento, California; Columbia, South Carolina, along with 11 surrounding counties in north central South Carolina; and the Menominee American Indian Reservation in northeastern Wisconsin. The Census Bureau believes these three sites will provide a good operational demonstration of Census 2000 procedures and systems.

Since the summer of 1996, the Census Bureau has been working closely with local officials and community-based organizations in each of the three sites to plan and build the various infrastructures needed to ensure a successful Dress Rehearsal. These joint activities include refining the geographic database, building and refining the address lists, and working with community and tribal organizations to plan effective outreach and promotion efforts. The Bureau has recruited staff in all

three sites to begin complete address list development and verification.

The Dress Rehearsal will allow for a thorough demonstration of the most critical procedures for Census 2000. These procedures include address list development, marketing and promotion, and data collection, processing, and tabulation. The Dress Rehearsal plan will also demonstrate the use of statistical sampling in four major census operations: nonresponse follow-up, housing units designated as undeliverable as addressed by the USPS, Integrated Coverage Measurement (ICM), and the long form survey (Discussed in more detail in Section V.)

11. Data Dissemination through DADS. The census provides a wealth of data that researchers, businesses, and government agencies are eager to research. Taking advantage of today's computer and Internet capabilities, the Census Bureau plans to make data from Census 2000 more readily available than any previous decennial census data. Census 2000 data will be tabulated and disseminated using the Data and Access Dissemination System (DADS). DADS will provide an interactive electronic system to allow data users to access prepackaged data products, documents, and on-line help, as well as to build custom data products on-line and off-line.

The Census Bureau has solicited the advice and recommendations of data users throughout the planning, design, and testing stages of DADS. DADS will be accessible to the widest possible array of users through the Internet and all available intermediaries, including the nearly 1,800 Data Centers and affiliates, the 1,400 Federal Depository libraries and other libraries,

universities, and private organizations. DADS will allow users to create customized products such as tables, charts, graphs and maps based on Census Bureau or user-defined geographic areas, and access metadata that provide documentation and explanatory information for data subjects and geographic areas.

12. Evaluation and Preparation for 2010. Once Census 2000 is completed, the Bureau will, as it has after all the censuses it has taken, conduct a variety of post-census evaluation studies. These studies will help data users, both within and outside the Census Bureau, to assess the data from Census 2000 and plan for the 2010 Census. In the past, these studies have relied on Demographic Analysis, statistical methods, and ethnographic analyses.

III. SUMMARY OF COSTS AND IMPROVEMENTS

The following table provides the estimated costs of Census 2000, allocated among ten major activities and their components. The costs are expressed in constant dollars projected for year 2000.

CENSUS 2000 MAJOR ACTIVITIES:COST AND IMPROVEMENTS FROM 1990 CENSUS		
ACTIVITY	COST IN MILLIONS	IMPROVEMENTS FROM1990 CENSUS
Building the Address List -Plan and conduct address validation operations in areas with city-style addresses - Plan and conduct address listing operations in areas with high concentration of non-city style addresses - Update and validate address list data	$286 $110 $132 $44	For Census 2000, the 1990 address list is updated with the United States Postal Service list and local address lists to account for about 81 percent of all addresses. The census address list and the census geographic file are totally integrated for Census 2000, which will enable enumerators to locate housing units faster. All city-style addresses have corresponding streets in the census geographic file and non-city style address locations are added to the census geographic file in Census 2000. Census address listers visit only a small portion of city-style addresses for field validation (for the 81 percent of addresses referenced above.) Local jurisdictions will be encouraged to review and correct the address list. Maintaining a nationwide, continuously updated and increasingly accurate census address list linked to the census geo-graphic file is critical to any census.

Testing the Reengineered Methods -Questionnaire mailing tests 1995 Census Test 1996 Community Census National Content Survey Race and Ethnic Targeted Test -Conduct Census 2000 dress rehearsal -Sampling and estimation design -Research use of administrative records	$218 $71 $37 $77 $33	Testing the new sampling and estimation methods will occur prior to being incorporated into Census 2000 on a larger scale. In addition to sampling for content (the "long form"), sampling and estimation will be used to 1) complete the nonresponse follow-up; and 2) produce a one-number census through Dual System Estimation.In Census 2000, the Bureau will use an automated matching system to ensure that each person is enumerated at his/her usual residence. This was largely a clerical operation in 1990.
Putting the Field Structure in Place -Field geographic support of address listings, data collection and tabulation activities -Recruiting, training, and documentation preparation -Regional management of field offices, including -space and support activities I.-equipment and telecommunications	$621 $67 $112 $171 $142 $129	The field office structure will be more streamlined and focused on data collection functions; for example, all questionnaires will be returned directly to the data capture centers. Data collection maps will be produced locally to better target enumerator activities. Development of an automated enterprise-wide integrated personnel and payroll system to administratively support the Census 2000 temporary workforce will permit efficient employment and payroll processing. Use of PC-based client server architecture for the key automation systems will provide an effective, flexible processing capability.

Reaching the Public/Marketing- -Design and operation of national advertising campaign -Partnership activities with state, local, and governments and national & umbrella organizations	$208 $100 $108	In Census 2000, the Census Bureau will use paid advertising by the "best in class" contractor versus *pro bono* advertising used in 1990. The Census Bureau will have more targeted outreach efforts than in 1990 through the use of Government Specialists, Community Specialists, and Media Specialists. The Census Bureau will hire a "best in class" contractor to develop and distribute curriculum and promotional materials about Census 2000 to schools.
Printing and Mailing Questionnaires- -Printing of initial and replacement questionnaires- -Printing of prenotice letter, reminder post card and other public use forms -Mailing of initial and reminder questionnaires -Mailing of advance notice letter, reminder post card and other public use forms	$419 $145 $27 $189 $58	For Census 2000, the Census Bureau has developed a new mailing treatment strategy (including an advance notice letter, first questionnaire, reminder/ thank you postcard, and replacement questionnaire) that has been shown to increase mail response. In areas with a high concentration of people speaking a language other than English, the Bureau will provide questionnaires in the appropriate language. For Census 2000, the Census Bureau has conducted extensive research and testing to develop user-friendly questionnaires that make self-response and participation in the census easier.

Data Collection, Including Nonresponse Follow-up- -Physical enumeration activities -ICM data collection	$1,408 $1,114 $294	The nonresponse follow-up operation in Census 2000 will incorporate the use of sampling to yield a 90 percent completion rate at the census tract level. In Census 2000, data collected in the physical enumeration and data collected in the ICM are integrated to produce one-number census. Use of a service-based methodology to enumerate people with no usual residence in Census 2000.
Capturing Data from Returned Formsand Telephone Interviews- -Data capture and processing oversight -Questionnaire receipt, check-in, editing, coding, and processing -Data capture center logistical activities -Processing system programming and support -Data capture system -Telephone questionnaire assistance and related activiies	$533 $29 $99 $48 $232 $76 $49	Census 2000 data capture process will employ the latest commercially available electronic imaging technology i.e., taking an electronic photograph or "image" of each questionnaire and using the image to capture the data. The design, development, production, national deployment, and support of the entire data capture system has been contracted out to a single systems integrator.
Delivering Data Summaries to the Public- -Prepare, review and distribute census results- -Prepare and distribute geographic products	$166 $137 $29	Development of an electronic data access and dissemination system and development/ design of Census 2000 data products to meet user needs for faster and more access to timely census data. This replaces many of the electronic and paper products produced in 1990.

Evaluating the Results -Collect and evaluate information for use in next census	$52	The Census Bureau will investigate potential methods for enhancirg efficiency and effectiveness of future census activities.
Operations Management -Managing the census	$86	Matrix management teams will generate efficiencies and lower staff levels at headquarters in Census 2000.
TOTAL	**$3,997**	

IV. IMPROVEMENTS OF TRADITIONAL METHODS IN CENSUS 2000

To ensure that Census 2000 will be both more accurate and more cost-effective than the 1990 Census, the Census Bureau has reviewed its procedures with input from a wide array of experts. The Bureau has asked these experts: Which parts of the process work best? Which can be done more effectively in some other way? Which can be eliminated? The result is an innovative departure from past practices that will substantially increase overall accuracy and address the differential undecount of children, renters, and minorities. At the same time, the new methods of enumeration will save money and deliver results more quickly. This chapter explains the improvements made to traditional census methods. Section V explains the improvements that involve scientific sampling.

A. The Master Address File

To conduct Census 2000, the Census Bureau must identify and locate an estimated 118 million housing units in the nation. The Bureau plans to accomplish this goal by developing and maintaining the Master Address File (MAF). This vital operation will take place with the assistance of the USPS, other federal agencies, tribal, state and local governments, community organizations, and by an intensive canvass of selected areas.

In 1990, whole housing units were missed often enough to contribute notably to the undercount problem. (See Section VIII (A)(1) for more detail.) Plans for Census 2000 are designed to address

weaknesses found in the 1990 address list. In 1990, the Census Bureau relied on address lists purchased from vendors. It found that the purchased address lists were less accurate in low income areas because the lists were originally generated for marketing purposes. Vendors tended to focus their attention on wealthier, and therefore more profitable, areas. The 1990 experience also demonstrated the need to identify more carefully housing units in advance and place them on geographical maps.

The MAF being prepared for Census 2000 should be superior to the 1990 address list. The MAF will start with the USPS address list, a list that does not discriminate against certain areas because of their marketing potential. Partnerships with state and local officials, community organizations, and tribal governments will also play an important role in making sure the MAF is accurate as the local officials who know the areas best will help develop the MAF. Finally, the method used to create the MAF in rural areas will be superior because of intensive efforts well in advance of the census.

City-Style Addresses. The USPS uses the term "city-style" for an address such as "123 Main Street," even though such an address occurs in small towns and increasingly along country roads. In areas where the USPS delivers mail primarily to city style addresses, the Census Bureau will create the MAF by combining addresses from the 1990 Census Address Control File with those addresses in the USPS Delivery Sequence File (DSF). The DSF is a national file of individual delivery point addresses. As part of a cooperative agreement, the USPS provides the

Census Bureau with updated DSFs on a regular basis. The Bureau then locates these addresses in its computer mapping system called TIGER (Topologically Integrated Geographic Encoding and Referencing). If an address cannot be located, the location is researched and resolved through an office operation or through assistance from local partners. As a result of this research, the Bureau identifies new features and corrects and adds address ranges to the TIGER data base.

Non-city-Style Addresses. In late 1998 and early 1999, the Census Bureau will launch a comprehensive effort to canvass areas where most residences do not have city-style addresses. Over 30,000 canvassers will visit approximately 22 million residences without a street address to fix their locations on the TIGER system. The combination of innovative use of computer data and technology, along with these visits to areas without city-style addresses, will allow the Census Bureau to construct the most accurate address list ever, giving field enumerators more time to meet the other challenges presented by the 2000 count. The Bureau will conduct the initial data collection phase in these areas by having enumerators deliver addressed census questionnaires during an update/ leave or an update/enumerate operation. Where there is no mailing address for the housing unit, or the mailing address is not a city-style address, the listing will include a location description.

The additional effort to identify and locate non-city-style addresses comes at a significant cost. City-style addresses are projected to cost $1.40 per case

compared to $6.00 per case for non-city-style addresses.

Remote Areas. In a few extremely remote and sparsely settled areas, census enumerators will create the address list at the time of the initial census data collection while canvassing their assignment area and picking up or completing unaddressed questionnaires that the USPS previously had delivered to each household. The completed address listings and their geographic locations will be captured at this time.

Nontraditional Living Quarters. A separate operation will build an inventory of all facilities that are not traditional living quarters, for example, prisons and hospitals. The Bureau will interview an official at each location using a Facility Questionnaire. The responses to the questionnaire will identify each group quarters and any housing units associated with the location. The Bureau will classify each group quarters and any housing units at the location according to whether they will be enumerated as part of special place enumeration or through regular enumeration. The Bureau will add those group quarters and housing units to the MAF and link them to the TIGER data base.

Local Government Partnerships. The Bureau will rely on local knowledge to build the MAF. State, local, and tribal governments, regional and metropolitan planning agencies, and related nongovernmental organizations are encouraged to submit locally developed and maintained city- style address lists to the Census Bureau to enhance the MAF. The participants will benefit by more complete and

accurate data for their area. The Census Bureau will match the local list both to the MAF and TIGER data base.

The Census Bureau will attempt to verify the status of each newly identified address through ongoing matches to updated address information from the USPS, other independent sources, and its own field operations. Addresses that are not found on the TIGER system will be researched and resolved.

The LUCA (Local Update of Census Addresses) program is a partnership that will allow local and tribal governments to designate a liaison to review the portion of the MAF that covers their jurisdiction to help ensure its completeness. LUCA participants will benefit by more complete and accurate data for their area. Prior to the Census and after the initial targeting operations or address listing have been completed, the Census Bureau will send the liaison a listing from the MAF and the accompanying maps for their jurisdiction. The liaison will review the addresses and provide the Census Bureau with updates (adds, deletes, and corrections). After processing the LUCA input, the Census Bureau will provide feedback on the status of the adds, deletes, and corrections to the liaison. The updated address list then will be used to deliver census questionnaires (either by mail or by an enumerator's visit).

B. New Outreach Methods

Several innovations are planned for outreach. Collectively, these new methods should increase response rates beyond those expected with the 1990 methodology.

Multiple contacts. For the first time ever, Census 2000 will implement a multiple mail contact strategy. Instead of mailing just one questionnaire, the Census Bureau will mail two waves of questionnaires, each preceded by a mailed notice/ reminder. This strategy has paid big dividends for the private sector and has proved effective in Census Bureau tests. The Census Bureau projects that a single mailing would result in further erosion of the response rate to 55 percent, but that its multiple notices and questionnaires will boost the response rate to 67 percent.

More ways to respond. In 1990, respondents had to find their form in the mail; in 2000, the forms will find respondents. The Bureau will make forms available in stores and malls, in civic or community centers, in schools, and other locations frequented by the public. A well-publicized toll-free telephone number will be available for those who wish to respond to the census by phone. In remote or sparsely-populated areas, enumerators will visit each housing unit and pick up or complete unaddressed short-form questionnaires and administer the long form at predesignated sample households.

Multiple languages. In 2000, as in all prior decennial censuses, questionnaires will be in English. For the first time in a decennial census, however, some households in Census 2000 will receive two questionnaires—one in English and one in another language. Specific neighborhoods known to have a high proportion of households more familiar with languages other than English will be sent questionnaires in their second language as well as a questionnaire in English. Forms in other languages will also be made

available in locations frequented by non-English speakers. The Census Bureau has made Spanish-language questionnaires available in the past, but questionnaires in languages other than English have never before been included in the initial mailout package.

C. New Technology

The Census Bureau plans to introduce several new technologies in Census 2000:

Unduplication. Modern technology allows the Bureau to spot and eliminate multiple responses from the same household. One of the main goals of Census 2000 is to make it simpler for people to be counted by having census forms available in public locations, provided in multiple language translations, and mailed out twice in mailout/mailback areas. Responses to the census also will be accepted over the telephone and possibly on the Internet. Providing these response options will make it easier for everyone to be counted, but will increase the possibility of multiple responses for a given person and household. A complete, accurate address list, high speed data capture capabilities, along with automated matching technologies will be the keys to avoiding the duplication of people and residences. Unduplication of multiple responses was not feasible or necessary in past Censuses because available technology and costs permitted only a small subset of person names to be data captured and unduplicated.

Data Retrieval Technology. Through contracting with private vendors, the Census Bureau will utilize the best available data capture methodology in

Census 2000. The Bureau has successfully tested the hardware and software that converts handwriting on the questionnaire into computer form with minor editing by a technician. The plan for data capture will use off-the-shelf hardware and software to record a full electronic image of every questionnaire. It will sort mail-return questionnaires automatically to ensure timely conversion and capture of critical information needed prior to nonresponse follow-up. It will use Optical Mark Recognition (OMR) to capture all check-box items, Intelligent Character Recognition (ICR) and key-from--image to capture write-in character-based data items. The Bureau will also conduct quality assurance on all data capture activities. The system will reduce the logistical burdens associated with handling large volumes of paper questionnaires. Once original questionnaires are checked-in, prepared and scanned, all subsequent operations will be accomplished using the electronic image and captured data.

V. USE OF SCIENTIFIC SAMPLING TO INCREASE ACCURACY

In our common experience, "sampling" occurs whenever the information on a portion of a population is used to infer information on the population as a whole. We use samples every day to characterize a larger group—for manufacturing quality checks, for medical tests, for determining air and water quality, and for conducting audits, to name a few. In laymen's terms, a "sample" is taken wheever the whole is represented by less than the whole. Among professional statisticians, the term "sample" is reserved for instances when the selection of the smaller population is based on the methodology of their science. The sampling proposed for Census 2000 is scientifically based; improves accuracy; eliminates the traditional undercount of children, renters and minorities; and saves money.

A. Reliance on Sampling in Previous Censuses.

In the debate over methods to be used in Census 2000, **the issue is not whether to "sample" but whether to sample scientifically**. Census takers have never been able to contact and count each and every resident of this nation. As a result, information on less than the whole population has always been used to characterize the whole population.

Census 2000 will not be the first time that the Census Bureau has used statistical methods to correct for problems in physical enumeration and to provide a more accurate final result. Since at least 1940, statistical imputation has been used when an

enumerator knew that a housing unit was occupied, but could not obtain information on the number of people living in that unit. In 1980, statistical imputation raised the physical enumeration total by 761,000 people. The number and rate of people imputed in the 1990 Census was only 53,590. Automated data control systems and field procedures may have discouraged enumerators from turning in incomplete questionnaires. In 1970, the Census Bureau used sampling to impute people to addresses that had initially been assumed vacant. The sample of 13,546 housing units initially presumed "vacant" found that 11.4 percent of them should be reclassified as "occupied." The National Vacancy Check added 1,068,882 people, or 0.5 percent of the total, to the 1970 Census.

Apart from the population totals, the Bureau has historically used statistical methods extensively to make up for incomplete census information. For example, information is asked about each individual's age, sex and race. Established statistical methods were used to infer missing information.

In other efforts, the Bureau has used statistical methods to represent the whole population when less than complete responses are obtained. For example, the Census of Industries every five years makes an effort to contact every large company in specific industries. Some companies do not respond and statistical methods are used to account for them in the totals ultimately published.

B. Support for Sampling within the Scientific Community.

The assumption underlying the traditional census method has been that the most accurate representation of the entire population would come from an intensive effort to physically contact every individual household. The experience of 1990 proved that this assumption was no longer valid and that to "pour more money into traditional methods" was not satisfactory. Because of changes in our society, a sample drawn by including only those physically contacted became markedly inaccurate. After 1990, a scientific consensus emerged that, while we should continue to pursue physical contact with every household to supply information, we should use the best statistical science to organize collection of information on those who fail to respond by mail or phone. In other words, the old system is no longer adequate in light of societal changes.

Census 2000 will use sampling in two new ways: (1) to follow up on housing units that do not respond by mail or phone; and (2) to use ICM to minimize the coverage error associated with past censuses. In addition, Census 2000 will sample housing units considered vacant by the USPS.

These methods have been endorsed by three Academy panels and by numerous other organizations:

- The American Statistical Association, a 157-year old group with more than 19,000 members nationwide, convened a "Blue Ribbon Panel" to assess the use of sampling in Census

2000. In its 1996 report, that panel "endorsed the use of sampling," concluding that it is "consistent with best statistical practice." It notes that "sampling is used widely in science, medicine, government, agriculture, and business because it is the fundamental basis for addressing specific questions in these areas. Sampling is a critical tool for reducing uncertainty." The report observed that "[s]pecific areas that use statistical sampling extensively include auditing, market research, quality assurance, approving new drugs, and medical testing . . . Sampling permits observations to be made efficiently, economically, and fairly."

- The American Sociological Association, founded in 1905, is a national professional society of 12,500 sociologists, research scientists, and others interested in research, teaching, and application of sociology. On January 25, 1997, the American Sociological Association unanimously approved a resolution supporting the use of sampling in the decennial Census. This resolution strongly urged "the Secretary of Commerce and Congress to support unequivocally the use of sampling for non-responding households and for reducing the differential undercount in the 2000 Census."

- The General Accounting Office also favors the use of sampling, stating that it is "encouraged that the Bureau has decided to sample those households failing to respond to Census questionnaires rather than conducting a 100-percent follow-up as it has in the past."

"Sampling households that fail to respond to questionnaires produces substantial cost savings and should improve final quality."

- The Inspector General of the Department of Commerce has repeatedly endorsed the plan to use sampling in Census 2000. Most recently, in a May 5, 1997 letter to Senator Stevens, Chairman of the Senate Committee on Appropriations, the Inspector General stated that, "[o]ver the past two years, we have issued reports, testified, and briefed bureau, departmental, and congressional principals and their staff members on our support for the use of statistical sampling in the 2000 Census. We continue to believe that, if carefully planned and implemented, sampling can be employed by the bureau in the 2000 Census to produce overall more accurate results than were produced in the 1990 Census, at an acceptable cost."

C. Sampling to Collect Long Form Data

The Census Bureau has used sampling techniques since 1940 to collect some of the most important decennial census data. Prior to the institution of the short form the Census Bureau had asked detailed census questions of every resident. In fact, the Census Act mandates the use of sampling in the decennial census, *see*, 13 U.S.C. §§ 141, 195. As it has in the last six decennial censuses, the Census Bureau will deliver the long form questionnaire to a sample of housing units.

In 2000, the long form will ask the same 7 questions that appear on the short form, plus questions on an

additional 27 subjects that are either specifically required by law to be included in the census or are required to implement other federal programs and the decennial census is the only source of the data. Using sampling to collect long form information will enable the Census Bureau to meet the objectives of controlling cost and maintaining or reducing respondent burden.

The long form is a cost-effective tool for gathering information to evaluate and implement federal programs. Dozens of agencies depend on the long form for the information they need to run their programs, including the Department of Defense, the Federal Reserve, the National Center for Health Statistics, the Department of Labor and many more. The following are just a few examples of how long form data is used:

- Federal and local emergency management agencies use census data to assess the amount of displacement caused by earthquakes, hurricanes, floods and other natural disasters.

- Planners must have information about where people work, where they live, how they get to work, and when they leave for work to build roads, tunnels, and bridges in areas that need them.

- The Department of Veterans Affairs uses census data on age, veteran status, period of service, years of service, and residence five years ago to determine where hospitals, nursing homes, and other services should be located.

The Census Bureau will use a variable rate sampling scheme in Census 2000 to collect long form data. The variable rate sampling scheme for Census 2000 will probably be similar to the 1990 sampling scheme:

- The overall sampling rate will be about one in six, or 17 percent.

- The sampling rate in general purpose governmental units with populations fewer than 2,500 will be one in two. Designated American Indian and Alaska Native areas will also receive a one in two sample.

- The sampling rate in other governmental units will be one in six or one in eight.

Variable rate sampling will allow the Census Bureau to allocate the sample efficiently while reducing respondent burden and maintaining the accuracy and reliability of census data at small geographic levels (census tracts, and small communities).

D. Sampling in the Postal Vacancy Check

As noted in Section V(A), the Census Bureau used sampling in 1970 in response to concerns that too many housing units had been erroneously identified as vacant. The Census Bureau estimates that the USPS will identify about five percent of all housing units as vacant in 2000. In order to correct for anticipated errors in this designation, the Census Bureau will send interviewers to one out of every ten of the housing units that the USPS indicates are vacant. The number of housing units that are found to be occupied and the number of people living there

will be used to estimate the total population of units initially designated as vacant. Scientifically proven statistical methods will be used to account for the total population and the estimated number of occupied and vacant housing units in the postal vacant universe.

E. Sampling for Nonresponse Follow-up

In conducting Census 2000, the Census Bureau will rely mainly on mail returns of census questionnaires, as it has in every census since 1970. If every housing unit returned its form by mail, the Bureau would not need a nonresponse follow-up operation, but the mail response rate declined markedly from 78 percent in 1970 to 65 percent in 1990. The Census Bureau estimates that mail response in 2000 would fall to 55 percent with one mailing, but can be raised to 67 percent with its current plan for two waves of notices and questionnaires and other innovations. That will leave 34 million occupied housing units not expected to respond.

(Chart)

The Bureau will attempt to contact these nonresponding housing units in the nonresponse follow-up portion of Census 2000. The Bureau's plan for this operation includes a limited use of statistical sampling to assure that data are collected from at least 90 percent of the housing units in each census tract. (A census tract is a neighborhood with roughly 1,700 housing units and 4,000 people. Tracts are designed to have homogeneous population characteristics, economic status, and living conditions. There will be more than 60,000 census tracts in 2000.)

All questionnaires mailed back during the data collection period will be included in the enumeration process.

The most difficult logistical segment of Census 2000 becomes more manageable with a scientific sample of nonresponding housing units. Enumerators must visit 22.5 million housing units rather than the 34 million housing units they would need to visit without sampling. Reducing the number of housing units to be visited will allow the Census Bureau to hire fewer and better qualified enumerators. And the time and effort that would have been spent recruiting, screening, training and managing additional temporary employees can be spent on meeting the other challenges involved in Census 2000.

By reducing the burden on enumerators, sampling for nonresponse follow-up will help ensure that the ICM can begin on time. The longer the delay between Census Day and the ICM, the more respondents are likely to provide inconsistent responses (out of forgetfulness, or because of the continuous turnover in housing units—which affects approximately 150,000 housing units each month).

In its second Interim Report on June 10, 1997, the Academy's Panel on Alternative Methodologies commented on the benefits of sampling:

> . . . [W]e do not believe that a Census of acceptable accuracy and cost is possible without the use of sampling procedures, both for non-

response follow-up and integrated coverage measurement . . . [T]he use of sampling will reduce the field workload and may result in more timely completion of the nonresponse follow-up procedures in the field.

Selecting the Sample for Nonresponse Follow-up. The addresses that will be part of the nonresponse sample will be evenly distributed across all addresses in each census tract not returning forms by mail or answer by telephone. The Census Bureau will achieve this goal by using scientifically-proven techniques, including computer-generated random sampling, to make sure that every nonresponding address in each census tract has an equal chance of selection. Enumerators will be given a list of specific addresses of nonresponding housing units within a census tract as soon as the mail-in phase is complete. Because these addresses are part of a random sample, they will be statistically representative of all housing units in that nonresponding tract.

To obtain information from 90 percent of housing units in each census tract, those tracts with lower mail response rates will have a higher share of housing units sampled. For example, for census tracts in which 80 percent of addresses return their forms by mail, the enumerators will be assigned randomly-selected addresses that represent half of the addresses that did not respond. If only 70 percent of addresses return their forms, enumerators will be assigned two of every three addresses not responding. And if the response rate is lower, enumerators will contact an even greater share of nonresponding addresses—more than adequately

covering all segments of the Census tracts not responding.

RESPONSE RATE	SIZE OF SAMPLE	TOTAL DIRECT CONTACTS
30 percent	6 in 7	90 percent
40 percent	5 in 6	90 percent
50 percent	4 in 5	90 percent
60 percent	3 in 4	90 percent
70 percent	2 in 3	90 percent
80 percent	1 in 2	90 percent
90 percent or more	1 in 10	91 percent

Note: The Census Bureau is reviewing the June 1997 recommendation of the Academy panel to increase the sample for tracts with high response rates.

Interviewing by Temporary Field Staff. The nonresponse follow-up operation is the largest single operation in Census 2000. In order to follow up with housing units not returning questionnaires in the mail, the Census Bureau will recruit, hire, train and supervise a massive temporary field staff. Since virtually every urban and rural community and neighborhood has housing units requiring follow-up, the Census Bureau must mount a nationwide recruiting campaign. Temporary staff are hired for this operation because it must be completed in only a few weeks. The most productive times to make contact with households are evenings and weekends, so this staff does not work a

full-time 40-hour work week. Most importantly, the Census Bureau tries to assign this temporary staff to neighborhoods with which they are familiar so that they are better received and the likelihood of collecting accurate data is enhanced.

Quality Assurance for Nonresponse Follow-up. The Census Bureau implements quality assurance operations for each of its major operations to insure that the results meet acceptable standards of quality. The quality assurance operation for nonresponse follow-up includes a reinterview of a portion of the cases completed by nonresponse follow-up enumerators. In this reinterviewing, an independent staff member conducts a brief interview to insure that the household was directly contacted the first time.

The Estimation Procedure. The characteristics of the sample housing units will be used to estimate the characteristics of the housing units not in the nonresponse follow-up sample. Take, for example, a census tract with 1000 housing units and mail-back responses from 800 (80 percent). In that case, information on the remaining 200 housing units would be based on a one in two sample of 100 housing units. If that same tract had responses from only 400 (40 percent), the Census Bureau would interview 500 addresses to estimate the 600 nonresponding addresses.

F. Integrated Coverage Measurement

Of all the innovations to improve accuracy in Census 2000, the most critical is Integrated Coverage Measurement (ICM). Inaccuracy largely stems from two problems. First, some housing units are never contacted because they are missing from the address

list. The Census Bureau's considerable effort to improve the quality of the address list for both urban and rural areas should serve to reduce the number of missed housing units. The second and much larger source of inaccuracy comes from missing people in housing units that do supply some information. The ICM not only helps with holes in the address list, it represents an effective way to address the second problem. That is why all three National Academy of Sciences panels recommended inclusion of the ICM in the plan for Census 2000.

The Census Bureau has a great deal of experience with Dual System Estimation, the methodology to be used in the ICM. The methodology was employed in the past two censuses to evaluate census quality. The methodology has undergone substantial review and improvement by the Census Bureau, the National Academy of Sciences, and by experts in statistical methodology from across the country. ICM methodology is generally accepted as the most reliable method to improve census results.

To conduct the ICM, Census Bureau enumerators will interview a carefully-selected random sample of about 750,000 housing units. This sample will be selected to include blocks from all areas of the country, with all race and ethnic groups, from all sizes of towns and cities, and from rural areas. The objective is to determine what proportion of the people living in the sample blocks were included and what proportion were excluded in the initial phases of the census. Because this sample is very large, and drawn separately for each state, it will provide reliable population numbers for every state and Congressional district.

Selecting the ICM Sample. As was done for the 1990 PES, to select the ICM sample for 2000, the Census Bureau plans to classify each of the country's seven million blocks into groups known as strata. These strata will be based on the characteristics of each block in the 1990 Census, such as the block's state, racial and ethnic composition, and proportion of homeowners to renters. The Census Bureau expects the types of sampling strata to be similar to those used for the 1990 Post Enumeration Survey (PES).

In Census 2000, the sample will be much larger (750,000 housing units versus about 150,000 in 1990) and strata will be defined within each state (strata crossed state lines in 1990). This will mean that in 2000, sample data from one state will not be used to determine the population total in a different state. In 2000, every state will have its own ICM sample, representative of all parts of that state. An example of a homogenous sampling stratum would be: All blocks in large central cities with a 1990 Census population that was 30 percent or more African American renters and with 10 percent or more Hispanic renters.

The Bureau will then select blocks at random from each stratum, for a total of 25,000 blocks. With blocks having an average of 30 housing units, the ICM will obtain information from 750,000 housing units. This process will establish a sample that is large enough, and sufficiently representative, to estimate population totals for each state. By stratifying and weighting the sample blocks the ICM will address coverage errors for specific population groups or areas, even if the individuals in the ICM sample constitute a relatively small part of the total population of the nation.

The ICM Address List. In order to ensure accuracy, the address list for the ICM is initially developed without use of the Master Address File. The Census Bureau will conduct a thorough, labor intensive canvass of each block in the ICM, an effort that would be logistically impracticable and too costly to repeat for all blocks in the entire nation. The list of addresses from the canvass effort is then matched with the MAF and differences are resolved.

The Initial ICM Interviews. Enumerators will use the ICM address list to conduct interviews at the 750,000 housing units in the sample blocks, and thereby establish an independent roster of Census Day residents. The enumerators will administer the ICM questionnaire and enter data via laptop computers. The Bureau expects to hire about 12,500 ICM interviewers and probably another 4,500 supervisors and quality assurance representatives.

Follow-up ICM Interviews. All housing units in which discrepancies are detected between the pre-ICM response and ICM response are designated for reconciliation and are usually assigned to a follow-up interview. The follow-up interviewer revisits each address for which there are inconsistent results and attempts to find the correct answer or the "true" situation. This process leads to a determination of whether the ICM response or the initial phase of the census is correct for a particular unit.

Poststrata. Each person is then assigned to a unique poststratum, or group of people who have similar chances (probability) of being counted in the initial data collection operation. The poststrata are defined by state geographic subdivision (such as rural or urban),

owner or renter, age, sex, race and Hispanic origin. The 1990 Census Post Enumeration Survey used 357 poststrata to characterize the population of four geographic regions of the United States. The ICM process in Census 2000 will also use poststrata to produce estimates for each state.

The results of the 1990 PES found that people living in rental housing units were much more likely to be uncounted. Therefore, the revised undercount estimates published in 1992 used owner-renter status in all the poststrata, except for Asians and Pacific Islanders, and American Indians on reservations. Basing the poststratification on the combination of variables defined by owner-renter status and race-Hispanic ethnicity improved the population estimates.

Nonresponse in the ICM. If the Census Bureau is unable to obtain an interview with an ICM sampled housing unit, despite intense effort, the Bureau will use imputation to account for the household. Imputation is a method that the Census Bureau has traditionally used when faced with legal deadlines and no alternatives to account for that household. Census Bureau research (from the 1995 Test and from the 1990 Census) indicates that imputation will have no major effects on the final results and that imputation is more accurate than leaving out missing information.

Dual System Estimation. Comparing the results of the ICM with the results of the initial phase of the Census will reveal who was missed in the sample blocks. The Bureau will then use a statistical method called Dual System Estimation to estimate the extent to which housing units and people were correctly included in the initial data collection phase, missed, or counted in error

for each state. Dual System Estimation is a widely-known and accepted statistical method that provides an accurate accounting of populations. Dual System Estimation works by comparing two independent sets (dual systems) of information on the same geographic area. In this case, the population being measured is in the 25,000 blocks that compose the ICM sample and the goal is to determine the true population of these blocks. For ICM sample blocks in Census 2000, the non-ICM set of information will consist of all direct responses gathered by mail, telephone, and personal visits. The second set of information comes from the ICM data on those sample blocks. Taken together, the two systems produce a single estimate of the total population.

Most of the housing units in the sample blocks and the people residing in them will be in both the initial phase and the ICM. A few people will be in one measure but not the other. Occasionally, an entire housing unit will be in one measure but not the other. Comparing the results of the ICM to the results from the initial effort (including mail, telephone and personal interviews) will inform the Census Bureau of the proportion of the population included in both, the proportion missed in the non-ICM effort, and the share included in the non-ICM effort but not in the ICM. These results are used to produce an estimation factor for each poststratum. Estimation factors account for the differences between the two efforts and for cases missed in both systems. The estimation factors are applied to the initial phase to estimate the total population and housing units in each poststratum. The sum across poststrata is used to estimate state totals. State totals are summed to national totals. The state level estimation factors by

poststrata are used to produce population and housing unit estimates for every block in the nation.

The Census Bureau is confident in the Dual System Estimation methodology based on its experience implementing Dual System Estimation and its expertise analyzing and explaining Dual System Estimation results. In 1990, the Census Bureau used Dual System Estimation to produce coverage estimates; the results from the 1990 Census were consistent with the independent benchmark of Demographic Analysis.

The Dual System Estimation theory requires that the two systems collect data independently. It does not require the ICM be superior to the "initial" system. In practice, the size of the sample will allow the Census Bureau to collect data in ways that would be prohibitive if attempted on the entire population. The ICM provides an independent, intensively-researched address list, and an intensive personal interview, designed to elicit complete and accurate information on people with characteristics that typically are missed in enumeration.

VI. OPTIONS FOR ADDRESSING AREAS WITH HIGH UNDERCOUNT RATES IN THE ABSENCE OF SCIENTIFIC SAMPLING

The Census Bureau has designed its plan to achieve the most accurate enumeration possible within the constraints of established statistical procedures, available and reliable technology, reasonable budget resources, and the conditions of modern American society. Some have argued that the Census Bureau should be prohibited from using established and widely-recommended statistical procedures, including sampling, and should rely solely on physical enumeration methods. To rely entirely on physical enumeration would result in a substantially less accurate census even though it would cost substantially more.

The Census Bureau believes that, without the introduction of a limited use of sampling, Census 2000 will be even less accurate than the 1990 Census. The population expected to have a high rate of undercount with traditional methods has grown more rapidly than the total population. As a result, the Census Bureau estimates that a physical enumeration in 2000 would fall short of the actual population by at least 1.9 percent—more than 5 million people. Moreover, conducting Census 2000 without sampling would not address the recurring problem of the differential undercount.

A. The Census Bureau Could Face Severe Labor Difficulties if Forced to Take Census 2000 without Sampling

To require that Census 2000 be conducted without sampling could raise practical hiring difficulties as well

as increasing cost. Just as changing conditions have reduced mail response rates, so have changing conditions reduced the Census Bureau's ability to attract and hire qualified enumerators. Using sampling techniques to complete the nonresponse follow-up operation significantly reduces the number of temporary enumerators that must be hired. Attracting and hiring a sufficient number of temporary employees in 2000 will be a difficult undertaking, even with the use of sampling.

The plan for Census 2000 assumes that the Census Bureau would have to hire over a quarter of a million temporary employees within a very few months. To do so, the Bureau would have to recruit over three million individuals. The nonresponse follow-up operation is particularly labor intensive. At peak employment, about 117,000 workers, approximately 47 percent of all temporary employees for Census 2000, would be hired to conduct the nonresponse follow-up at 22.5 million homes. Without sampling, enumerators would have to visit an additional 12 million homes, requiring 59,000 additional enumerators for the nonresponse follow-up operation. The Census Bureau has retained the services of Westat, Inc. to help it develop a model for setting enumerator wage rates in 2000. Wages will have to be set high enough to attract and *retain* qualified employees.

B. The Only Alternative to Sampling Would Be to Rely More Heavily on Traditional Methods, Methods with Proven Limits

The Census Bureau agrees with the Academy's conclusion that more radical alternatives to a traditional enumeration (a national register, an administrative

records Census and a Census conducted by the U.S. Postal Service) are either not feasible or not consistent with American values.

As discussed in Section III, the Census Bureau is committed to using traditional enumeration methods and the plan for Census 2000 contains several innovations to these traditional methods. The Census Bureau's experience, and the Academy's research, however, indicate that even with improvements traditional methods of enumeration cannot achieve satisfactory accuracy.

Between 1970 and 1990, the Census Bureau tested a number of outreach, coverage, and collection procedures designed to increase accuracy, particularly in areas with high undercount rates. Some of these innovations, described below, improved accuracy—though they did not prevent the level of inaccuracy from rising in 1990—and will be used in Census 2000. Other innovations were proved to be prohibitively expensive, hard to control, error prone, or ineffective.

Among the innovations that have been tested are:

Advertising—The Census Bureau launched a massive outreach campaign in the 1990 Census, using public service announcements as advertisement. The Bureau's conclusion was that advertising improved the mail response rate but that its effectiveness in reaching areas with high undercount rates needed improvement.

Status: In Census 2000 the Bureau plans a $100 million paid advertising campaign targeted at areas with low mail response rates. (See the discussion in Section II (B)(2))

Advance Post Office Check—USPS letter carriers in 1990 verified the completeness of the address list by making corrections, identifying duplicate and undeliverable addresses, and reporting missing addresses. This approach was successful, but not efficient enough.

Status: Better partnership with the USPS and with state, local, and tribal governments have allowed the Bureau to replace this procedure with more efficient and more comprehensive programs for Census 2000. The 1990 Census spent too much time and money developing an address list that the USPS already had assembled. For Census 2000, the Census Bureau began with the USPS information to avoid a costly duplication of effort. State, local, and tribal governments are working with the Bureau to correct and update census maps on a continuing basis.

Casing Check—Immediately prior to the delivery of the 1990 Census questionnaires, USPS letter carriers identified deliverable and undeliverable addresses, and notified the Bureau of any homes on their route that did not appear on the Bureau's list.

Status: Better partnership with the USPS, and with state, local, and tribal governments have allowed the Bureau to replace this procedure with more efficient and more comprehensive programs for Census 2000.

Census Awareness and Products Program—This program built awareness about the 1990 Census by educating the public and encouraging it to participate. Census Community Awareness Specialists were hired to contact teachers, mayors, religious groups, and others, and to develop promotional materials.

Status: This program forms the basis of the Census 2000 partnership programs.

Census Closeout Address Check—During the final stages of field follow-up activities in 1990 USPS letter carriers provided information about the type of structure, occupancy status on Census Day, and the number of Census Day occupants for unenumerated units. This approach was successful, but not efficient enough.

Status: Better partnership with the USPS, and with state, local, and tribal governments have allowed the Bureau to replace this procedure with more efficient and more comprehensive programs for Census 2000.

Parolee/Probationer Coverage Improvement Program—People on parole or probation completed a unique census form to help ensure that they were counted in the 1990 Census.

Status: The Census Bureau dropped this program from consideration for Census 2000 because it was error prone and not cost effective.

PreCensus and PostCensus Local Review—In 1990 local and tribal government officials reviewed housing unit counts and group quarters population counts for each Census block in their jurisdictions and identified missed units.

Status: This program has been replaced in Census 2000 by the greatly expanded Local Update of Census Addresses (LUCA) program, made possible by amendments to Title 13.

Recanvass—Enumerators did a second canvass of addresses in selected neighborhoods to look for missed units in areas with evidence of deficient housing unit counts.

Status: The Census Bureau dropped this program from consideration for Census 2000 because it was ineffective.

Shelter and Street Enumeration—The Census Bureau took a special enumeration of people in shelters and at pre-identified street locations in the 1990 Census.

Status: In Census 2000, the service-based enumeration operation will use statistical estimation to improve the enumeration of people with no usual residence. ICM procedures will be adapted to conduct an initial enumeration at locations where people with no usual residence receive services (shelters and soup kitchens). A second visit may be conducted at a sample of locations to account for people who were not present at the time of the initial data collection operation, but who do use services at other times. If sampling and estimation were prohibited, the Census Bureau could not make this follow-up visit. People who were not present at the time of the initial data collection operation would be encouraged to use other opportunities to be included in the census but coverage of the people who frequent these sites would not be as complete.

Telephone Assistance Adds—In the 1990 Census, people who called to say they had not received a questionnaire in the mail were told to wait for a personal visit interview.

Status: The Census Bureau will expand the telephone assistance program in Census 2000 to include the ability to take interviews over the phone.

Transient Enumeration—The Census Bureau took a special enumeration of individuals residing in hotels, motels, tourist homes, campgrounds, and marinas in the 1990 Census.

Status: This program has been retained for Census 2000.

Vacant/Delete/Movers Check—Enumerators revisited all addresses classified during nonresponse follow-up as vacant or delete to verify Census Day occupancy status and to complete questionnaires for people who moved during the enumeration period.

Status: This operation will be done more efficiently in Census 2000 by revisiting only a sample of the units classified as vacant. Without sampling, that efficiency would be lost.

Were You Counted Campaign—People who thought they were missed in the 1990 Census had the opportunity to complete a simplified census questionnaire late in the census program.

Status: In 2000, the "Be Counted" program will make census forms available in public places, such as community centers and post offices—at the same time as key data collection activities and advertising are taking place.

Post Enumeration Post Office Check—An operation to improve coverage in very rural areas was used in the 1970 and 1980 censuses. After the census enumeration

was completed, the Postal Service reviewed the addresses collected by the enumerators and identified any missed living quarters.

Status: This approach was not successful enough to merit its continuation.

C. Spending More on Outreach Instead of Sampling Would Leave an Unacceptably Large Undercount and Have Biased Results.

Spending more on public outreach and enumerators will not adequately address the undercount problem. For a variety of reasons, accounting for every address does not guarantee that every person at that address is reported. In some cases, nontraditional family situations make reporting difficult. For example, children who share time with divorced parents, or with their extended family, may not be counted in either household. In other cases, non-traditional housing situations may lead to incomplete results. For example, landlords may assume that a tenant sharing their home is being counted separately. In some cases, individuals are missed because the respondent could not list his or her entire family in the space provided, or because the respondent's English language skills are limited. In others, individuals are missed because of enumerator error.

D. Without Sampling, Costs Would Increase by at Least $675 Million and the Final Count Would Be Less Accurate Than the 1990 Census.

As planned, Census 2000 is projected to cost approximately $4 billion. A cornerstone of the Census Bureau's plan is to reduce costs and increase accuracy by using scientific sampling methods while making a

"best faith effort" to include every resident of the United States with traditional enumeration methods. The use of statistical methods, both to complete nonresponse follow-up and to implement the ICM survey, will address historic problems associated with cost, incomplete coverage, and the differential undercount. Using sampling techniques to finish the initial phase will provide the time and funds needed to implement the ICM survey, which will eliminate the need for costly add-on operations that otherwise would be necessary to increase the completeness of Census 2000. If sampling is prohibited while these add-on activities are implemented, Census 2000 would probably leave approximately 1.9 percent of the population uncounted and thus be even less accurate than the 1990 Census.

The following sections analyze available options for reducing the undercount in areas with high undercounts, without the use of statistical methodologies. The increased costs, which are summarized at the end of this Section, would be attributable to the following additional expenditures:

100 Percent Follow-up On Non-Responding Units. After the mail and telephone response period, the plan for Census 2000 calls for collecting information from a sample of nonresponding addresses in each Census tract. The sample will be drawn to assure that information will be obtained from at least 90 percent of addresses in each census tract. This effort will require sending enumerators to 22.5 million addresses. However, with a ban on sampling, enumerators would have to visit all of the expected 34.5 million nonresponding addresses. To send enumerators to an

additional 12 million nonrespondent addresses would cost a projected $400 million more.

Significantly More Effort Would Be Required to Verify Vacant Units. Since 1970, letter carriers have been the primary source of information as to which housing units are vacant. Because the 1970 Census found 11.4 percent of its sample of vacant units were in fact occupied, the Bureau had to raise the enumeration level by more than one million persons. In the 1990 Census, the Census Bureau initially classified about 7 million housing units as "vacant" and 3 million addresses as "not living quarters" and assigned them for field verification. About 9 percent of the initially "vacant" units had to be reclassified as "occupied" on Census Day and about 12 percent of the units classified as "not living quarters" changed classification after field verification. In total, this effort resulted in counting 1.5 million more people.

The plan for Census 2000 includes a field verification of a ten percent sample of the cases identified as vacant by the Postal Service. The Bureau expects that the USPS will identify five percent of housing units as being vacant on April 1, 2000. This verification will ensure the integrity of the information provided by the USPS, and gather information about the characteristics of those vacant units. If sampling were not permitted in Census 2000, the additional amount of effort and person hours needed to verify occupancy status would dwarf the considerable effort now planned. Under a 100 percent verification plan, the Census Bureau would assign all of these cases to field staff to verify their status as of Census Day. The field visits will be integrated with nonresponse follow-up, starting in

April 2000. This additional effort would require 25,000 to 30,000 enumerators, as opposed to the 5,000 required using sampling, at an additional cost of $200 million.

100 Percent Follow-up of Incomplete Questionnaires Would Be Necessary. The plan for Census 2000 requires only a computer check of the questionnaires that are returned by mail for evidence that coverage problems exist. Questionnaires flagged as having problems are sent for a telephone follow-up to attempt to resolve the discrepancies. Estimates are that approximately 0.5 percent of questionnaires will require follow-up. The ICM will account for coverage errors not corrected by this operation. The plan also includes follow-up for households containing more than five people (since the questionnaire only provides space for recording data for five people).

A plan that does not include sampling would require a much more thorough editing and follow-up of the questionnaires. During the processing of mail returns, phone-in responses, and check-in of enumerator-completed questionnaires at Local Census Offices, the Census Bureau would identify all cases that require additional contact to ensure the accuracy of the reported information. These cases would include households that return a blank questionnaire in the mail, questionnaires with a discrepancy between the total number of household members and the number of people for whom census data are provided (for example, the questionnaire lists the names of four persons but provides information only for two), and questionnaires with other indications of coverage problems, such as confusion over residency status. This additional effort would cost $150 million more than current plans.

Expanded Partnership and Promotion Activities Would be Required. The promotion and outreach program is designed to motivate people to respond. While the Census Bureau does not envision additional partnership and promotion *activities* if it is not allowed to use sampling, the time period for planned promotion activities would have to be extended to include a longer nonresponse follow-up period. Also, the Census Bureau would need to hire additional staff to provide at least one partnership specialist for each Local Census Office. The Bureau would expect to pay $75 to $150 million more for these activities.

Deployment of Special Enumeration Activities. The Census Bureau has developed targeted methods to supplement its basic data collection strategy. If the Bureau is banned from using the best available statistical methods in 2000, the activities summarized below would need to be to intensified, and started sooner than currently planned. They would cost $25 to $50 million more.

Team enumeration. In targeted areas, a team or crew of enumerators conducts the enumeration in a short period of time. Team enumeration will be used in areas where conditions in the field may interfere with the timely completion of the enumeration. These conditions may be high concentrations of multi-unit buildings, enumerator safety concerns, and low enumerator production rates.

Urban update/leave methodologies. The urban update/leave operation will be conducted in selected urban areas where mail delivery is a problem. During the operation, enumerators in

teams will hand-deliver census questionnaires to households and ask respondents to complete the forms and mail them back.

Quality Assurance. The techniques used for quality assurance operations would need to be enhanced. Without ICM to provide final quality assurance, all quality assurance operations will require extra efforts at an extra cost of $25 to $50 million.

Post Census Evaluation Study. The Census Bureau will conduct a thorough evaluation of Census 2000. Without the use of sampling the Bureau would gather data for the evaluation through a post enumeration survey.

Summary of Additional Costs with a Ban on Statistical Methods

100-Percent Follow-up on non-responding units	$400 million
100-Percent Follow-up on Vacant Housing Units	$200 million
100-Percent Follow-up on Incomplete Questionnaires for Coverage	$150 million
Expand Partnership Activities	$25-50 million
Expand Promotion Activities	$50-100 million
Deploy Special Enumeration Activities	$25-50 million
Greater Quality Assurance	$25-50 million
Eliminate Integrated Coverage Measurement (ICM)	-$325 million
Conduct 1990-style Post-Census Evaluation Study	$125 million
TOTAL:	$675-800 million

VII. AN ILLUSTRATION: THE MILWAUKEE COMPLETE COUNT CAMPAIGN

The Milwaukee Complete Count campaign illustrates the benefits and limitations of increased public outreach efforts in support of the census. The city government of Milwaukee, Wisconsin, was one of the Census Bureau's most enthusiastic supporters for the 1990 Census. Its "Complete Count" outreach campaign began in October, 1989, with a rally, peaked with a wide variety of activities from February through April, 1990, and ended with a "Were You Counted?" campaign in June, 1990. The cost to the city was about $300,000, plus another $55,000 of in-kind services. Additional donated and discounted services were valued at $62,000.

While Milwaukee's efforts increased its count, they also demonstrated that the best of efforts still leave a sizeable undercount. Even with Milwaukee's unprecedented efforts, the Post Enumeration Survey indicated that approximately 2.3 percent of the city's residents were missed, which was higher than the national average.

Research on 1990 Census outreach efforts such as those in Milwaukee has found that such efforts increased mail response, but did not eliminate coverage error. Milwaukee's efforts probably raised the mail return rate because its return rate of 76 percent was slightly higher than the national average of 74 percent (among the 26 cities of 500,000 or more, Milwaukee ranked third in mail return rates). A higher mail return rate still left 24 percent of occupied units in the city to be counted by door-to-door enumerators, and not every Milwaukee

Census tract had 24 percent non-response to mail questionnaires. Those tracts with minority populations of 80 percent or more had a mail nonresponse rate of 40 percent, almost four times the 11 percent rate in Milwaukee tracts with less than 10 percent minority populations.[4]

Administrative data also confirm a bias with traditional census methods, even with an aggressive outreach campaign such as that conducted by Milwaukee in 1990. An academic study compared the number of children found in Milwaukee in the 1990 Census with the number of children on AFDC records. The study found that the 1990 Census undercounted children in 52 selected census tracts.

Was Milwaukee's Complete Count campaign a success? To the extent that the campaign boosted mail response, it was a success. But the Milwaukee campaign also demonstrated the limits of spending money on outreach. Outreach has the potential to improve accuracy by boosting the mail return rate; it does not eliminate the undercount or the differential undercount.

[4] The mail return rate is calculated by dividing the number of mail returns by the number of housing units that were occupied. This rate differs from the "Mail response" rate mentioned earlier in this report that is calculated by dividing the mail returns by *all* housing units (including vacant units and deleted units). The mail response rate is important to use during Census operations to determine quickly the nonresponse follow-up workloads.

VIII. EXPECTED ERROR RATES

Errors in the census can arise from many sources—from respondents misunderstanding instructions, declining to participate, or giving inaccurate answers; from enumerators, postal workers, telephone operators, and data processors who make mistakes; from incorrect address lists; from poorly-worded questions; and from the way a census is planned and implemented.

Errors are grouped into two basic types — those that occur during the measuring or data collection process **(nonsampling error)**, and errors that occur because only part of the population is being directly contacted **(sampling error)**. Nonsampling error occurs in both censuses and sample surveys; sampling error only occurs in sample surveys. Nonsampling errors can be the most serious types of errors because they yield *biased* results when most of the errors distort the results in the same direction. Decennial censuses have traditionally experienced nonsampling errors, most notably coverage error, or undercount, resulting from persons missed or double counted during the enumeration process.

A. Nonsampling Error

Reducing and measuring nonsampling error is more complex than measuring and reducing sampling error. Sampling error can be measured, which is the reason it often gets more attention than nonsampling error. But nonsampling error and its consequent biases are present throughout the census process and can reduce the quality of results more than sampling error.

Sources of non-sampling error include:

1. Coverage Error. The 1990 Census and earlier censuses have been criticized for coverage error, that is, for missing people and housing units. This coverage error arises from two general problems— missing entire housing units and missing some or all of the people in an enumerated unit. Based on the 1990 PES results, 69.5% of the coverage error came from enumerated housing units and the remaining 30.5% came from housing units that were not enumerated at all.

2. Nonresponse Error. Nonresponse error occurs when (1) housing units or people cannot be located or refuse to participate, or (2) answers to one or more items on the questionnaire are missing.

3. Observational Error. Observational error occurs when the questions asked on a census or survey yield inaccurate answers. These kinds of errors can be attributed to the interviewer, the questionnaire, the respondent, or the means by which the data are collected (telephone, personal visit, mail).

4. Data Processing Error. Data Processing error occurs after the data are collected, as a result of actions of processors—during data entry, coding, editing, tabulation and other processing activities. Errors can also be introduced when missing data items are created from statistical modeling procedures (*i.e.*, imputation).

B. Sampling Error

With any sample, scientifically selected or not, differences are likely to exist between the characteristics of the sampled population and the larger group from which the sample was chosen. However, in a scientific

sample, sampling error is readily measured based on the mathematics of probability. Estimates of sampling error are referred to as sampling variance and are commonly expressed as the standard error as a percent of the population total. To a certain extent, sampling error can be controlled—samples can be designed to ensure comparable levels of error across groups or across geographic areas.

C. Error Related to Estimation

1. Model Error. Model error results from the use of statistical techniques to apply what one has learned from a sample of the population to improve the numbers for the entire population. For Census 2000, this type of error can arise in using ICM results to improve the census totals. The effect of model error is that the improvements being made to the totals are not perfect. The accuracy of ICM is based on the assumption that all individuals have the same chance to be included in the initial collection phase or in the ICM. The chances of inclusion can be different for the two systems. Because past experience with differential undercount demonstrates that some groups in the population are more likely to be missed in any physical enumeration, the Census Bureau defines poststrata. Poststrata are groupings based on variables that previous studies have shown to be related to coverage error. Examples of poststrata are renter-owner status, race and Hispanic origin, age, sex and urban-rural residence. Dual System Estimation assumes that the probability of being included is uniform *within* these poststrata. However, there still are differences among the individuals grouped within each poststratum. These differences are called "heterogeneity."

Heterogeneity within a poststratum affects the census totals in two ways and can result in an overestimate or an underestimate of the count. First, the estimation within a poststratum can fail to capture the variation in coverage error among small areas. Second, heterogeneity can make the poststratum estimate too low, so that not all misses are measured. This second effect is called correlation bias. Correlation bias is caused by the fact that people missed in the initial mail response and nonresponse follow-up are also more likely to be missed in the ICM survey. This problem leads to lower estimates of the undercount. Several research projects are in progress to assess and deal with error stemming from heterogeneity.

2. Matching Error. Matching error occurs, for example, when the ICM results are compared with the results of the initial phases of the enumeration. A person could be "in" both systems in reality, but only identified in one—either the initial phase or the ICM. When a difference is detected between the two data sets, follow-up interviews are conducted to resolve the inconsistencies. New computer technologies in Census 2000 for unduplication should reduce matching error.

3. Contamination Error. Contamination error occurs when there are two separate data collection activities. This error occurs when inclusion in one collection affects the response in the other collection.

D. Gross Error Versus Net Error

There are three types of coverage error—omissions, duplicates, and erroneous inclusions. Omissions occur when housing units or people are missed. Duplicates occur when housing units or people are included more

than once. Erroneous inclusions occur when people are incorrectly included in the initial enumeration because they are fictitious, in the wrong geographic location, etc. These types of errors can be combined to produce either net error or gross error numbers. Gross error refers to the total number of errors made in the census, while net error refers to the total effect of these errors on the resultant statistics. For gross error, the effect is additive; that is, the sum of people omitted *plus* duplicates *plus* erroneous inclusions. For net error, the errors are treated as an excess (duplicates and erroneous inclusions) or deficit (omissions), depending on the type of error, and the effect of combining produces a canceling-out effect. Gross error measures the total number of mistakes; net error measures the undercount.

The 1990 Post Enumeration Survey (PES) was designed to measure the net undercount in the 1990 Census by population group and to provide the data to adjust for that net undercount. However, due to interest in the level of gross errors, the data have been used to provide estimates of gross omissions, gross erroneous inclusions, and total gross coverage error. As the PES was not designed to estimate gross errors, there was no specific method for obtaining these estimates. Care must be taken in interpreting the gross error numbers; some of the measures and concepts are appropriate only when considered in terms of the way they produce net estimates, and all the PES numbers are subject to sampling error.

The Census Bureau cannot measure precisely and separately the effects of all the types of error described above. To the extent that it can measure and compare

gross error, the Bureau has reviewed the gross (combined) error for 1990 and estimated the likely net error for 2000 with and without sampling.

The 1990 Census had a net undercount of approximately 4 million people. This figure is called "net" because it is the difference between the number of residents who were not counted at the geographic location being considered, less those residents incorrectly included or counted twice at the geographic location being considered. The gross error in the 1990 Census, however, was more than 26 million people: 15 million people were not counted at all, or were not counted in the correct block, while 11 million people were incorrectly included in a block. The incorrect inclusions may have been counted in more than one block or merely assigned to an incorrect block. The net number of people not included in the national total represents the 4 million national net undercount.

Many users of census data are interested in gross error based on larger geographic areas, that is, many users do not care whether the people are counted in the correct block. When one ignores errors associated with individual blocks or other small areas, the gross error in 1990 was about 12.8 million people, with 8.4 million people not counted and 4.4 million people counted twice or incorrectly included in the census.

Looking to Census 2000, the Census Bureau has estimated the likely net error (from those types of error that can be measured) both for its plan and for a physical enumeration plan. A plan without sampling would include all the modernization plans for Census 2000 except for those that involve sampling. A modern non-sampling plan would cost $675 to $800 million more

than the current sampling plan (additional costs detailed in Section VI (D)) and would be substantially less accurate.

E. Summary of Estimated Error, by Geographic Level Down to the Census Tract, for Plan Alternatives

The Census Bureau and the Academy believe that the introduction of a limited use of sampling will make the census more accurate at the geographic levels for which its data are most critical: national, state, and Congressional district. With sampling, the estimate is just as likely to be above the true population as below it. The error declines as small areas are added together to create larger ones, such as Congressional districts.

All error figures in the table below were derived using simulations of 1990 Census estimates of undercounts and overcounts for census tracts. The Bureau has concluded that the error from the proposed plan will be 1.1 percent at the census tract level, 0.6 percent at the Congressional district level, 0.5 percent at the state level, and 0.1 percent at the national level. In contrast to sampling, physical enumeration methods are more likely to result in an underestimate of the population regardless of the size of the population area. The projected error from a physical enumeration and with no sampling in 2000 would average 1.9 percent at all levels from the census tract level to the national level.

	National	States	Congressional Districts	Census Tracts*
The Census 2000 Plan	0.1%	0.5%(0.2% - 0.5%)	0.6%(0.3% - 2.3%)	1.1%(0.6-%2.4%)
Improved procedures without any sampling	1.9%	1.9%(0.4% - 3.2%)	1.9%(-1.2% -7.0%)	1.9%(-1.2%-6.2%)

*The range of error at the tract level has been "trimmed" so that it does not include the most extreme outliers—the highest and lowest 3 percent.

(Chart Omitted)

Note that this simulation exercise does not produce the same errors for all states, Congressional districts, or tracts. The estimates shown in the table are the average errors at each level. The numbers in parentheses show a high and low range of estimated errors at each level on a consistent basis. The "Combined Error" figures for Congressional districts and census tracts do not include error due to modeling; model error would not apply to the nonsampling alternative.

To account for expected growth in the population of the United States through the year 2000, the 1990 census tract population totals by race and Hispanic origin were projected using factors derived from a widely used process known as Demographic Analysis. The simulations assume that the percentage undercounts (and

overcounts) measured for each group in the 1990 PES also would apply in Census 2000. To determine the amount of undercount or overcount for each census tract, the projected population totals for each were computed with and without the results of the 1990 PES for each region and for the various segments of the population within it. The totals for the specific census tracts in each geographic entity were summed to derive the error rates for more populous geographic levels, such as Congressional districts, states, and the nation.

In addition to foregoing improvements in accuracy, a ban on statistical procedures in Census2000 would have other wide-ranging effects. Such a ban would preclude the cost-effective use of statistical sampling to check the vacancy information provided by the USPS. It would preclude the two most significant operations planned to reduce costs and improve the accuracy of Census 2000: the use of statistical sampling to finish the initial task of making contact with someone at an address; and the use of statistical sampling to account correctly for those individuals who are missed or counted more than once during the initial operation and follow-up. The bottom line is that a ban on scientific sampling for Census 2000 would make the census less accurate than it could be, and more costly than it should be.

F. Error Rates at the Block Level

Given the constitutional purpose of the census to serve as the basis for apportioning the 435 seats in the House of Representatives among the states, the census is designed to maximize accuracy at the state level. Because census results are also important for drawing state legislative district boundaries and allocating

grants to substate jurisdictions, the Census Bureau must also concern itself with accuracy for smaller geographic areas.

Neither the traditional methods used in the 1990 Census nor the scientific sampling methods planned for 2000 have emphasized accuracy at the block level. This lack of emphasis is appropriate because the population of stand-alone blocks is not used to determine legislative districts or to distribute population-based funding.

Error rates were quite substantial at the block level in the 1990 Census. The blocks in the Post Enumeration Survey had an average error of 7.6 percent. In many cases, a housing unit was assigned to the wrong block, which contributed to error in two blocks, one positive and the other negative. Just as with sampling error, large block level errors due to assignment to the wrong block tend to cancel each other out when blocks are aggregated together. When blocks are aggregated to census tracts and larger geographic areas, sampling errors decline sharply. The percentage error rate also falls when aggregating from the block level to the tract level using only traditional methods, but it does not decline as sharply as sampling error does, so that a sizeable undercount remains. Thus, at the census tract level and larger areas of geography, the Census 2000 plan is more accurate than a census without sampling.

The Academy Panel on Alternative Methodologies warned against putting too much emphasis on accuracy at the block level in its Second Interim Report last month:

> The important point to note here is that for the counts for census blocks, the level of sampling error is, relatively speaking, not an appropriate criterion for judging the quality of the census. Athough block counts may contribute to the congressional redistricting process, for example, it is important to keep in mind that the results in a redistricting process are the counts for the congressional districts that are eventually created (and to a lesser extent, the counts for districts that were, or conceptually might have been, considered but were discarded). For these kinds of counts, the level of sampling error will be modest because the larger the number of observations used for an estimate, the smaller its sampling error will be.
>
> Thus, in the panel's view, the important considerations for evaluating whether the amount of sampling error present in the census process is acceptable are not those that relate to counts for very small units, such as blocks. It is clear that at that level, sampling error may be substantial in some cases (again, relative to the size of the block). The evaluation of sampling error should take place for the geographic level counts that have important legal, political, or financial implications. For such levels, a census that uses sampling can achieve results that are at least as good as those from a more time-consuming and expensive effort to obtain a completed form for every household.

Questions have been raised about calculated error rates at the block level in the 1995 Census Test of some census methods. The 1995 Census Test, conducted in Oakland, California, Paterson, New Jersey, and six

parishes in Northwest Louisiana, was designed as an experiment to test various methodologies for sampling for nonresponse follow-up and Integrated Coverage Measurement; the test was not an attempt to demonstrate Census 2000 sampling methods. In particular, the 1995 test has no relevance for the important question of whether a census based on scientific sampling is more accurate than a census based only on physical enumeration. The only estimates of error at the block level in the 1995 test result from statistical theory based on the size of the sample. The estimates do not compare the results of sampling with the true population total at the block level, an unknown number.

The following table shows the block level sampling error of the samples used in the 1995 Census Test:

Summary Statistics for the Block Level Coefficients of Variations 1995 Census Test Sites

Test Site	Weighted Average	Minimum	Maximum
Paterson	0.1828	0.0559	2.4336
Oakland	0.1262	0.0403	1.4359
NW Louisiana	0.2519	0.0438	1.5142

Source: 1995 Census Test

The nonresponse sample sizes in each site for the 1995 Census Test were much smaller than the Census 2000 design would require. In Oakland and Paterson, the

Census Bureau sampled about one in three nonresponding housing units, while in Northwest Louisiana, it sampled one in four. Under the Census 2000 design, the Census Bureau would have sampled approximately three out of every four nonresponding housing units in Oakland and Northwest Louisiana; the rate in Paterson would have been five in six, given initial response rates in these three sites.

The implication of the smaller sample sizes is that the block level error rate from the 1995 Census Test is substantially greater than the expected error rate using the Census 2000 design. The effects are illustrated by comparing what was achieved in these three sites to the sampling error expected in Census 2000. For Paterson and Northwest Louisiana, the 1995 errors were three times or more larger than anticipated 2000 errors. For Oakland, the errors in 1995 were about 2.5 times as large. These calculations are based on the current Census 2000 design of reaching 90 percent direct response in each census tract.

Calculations of average error for small blocks can be misleading to those unfamiliar with these statistics. Statistical theory expects that small samples from small population blocks will have large errors. But a large percentage error of a small population number is still a small number. For example, the block in Paterson, New Jersey, that had an estimated error rate of 243 percent had only one resident. Because small blocks contribute less in any aggregations, the large percentage errors for some small blocks have little practical effect.

IX. PROCEDURES TO ENSURE UNBIASED STATISTICAL DECISIONS

Concern has been expressed that the formulas for drawing samples or for extrapolating from sample data in the Census 2000 could be surreptitiously manipulated for political ends.[5] This concern is misplaced. Every effort has been made to ensure the independence and integrity of the decisions by the professional statisticians at the Census Bureau. The professionals have been—and will remain— insulated from political interference throughout the Census 2000 process.

The Census Bureau has a long history of political independence. The Bureau refused, when requested during World War II, to identify Japanese-American individuals from Census Bureau records, relying on its specific confidentiality requirement in Title 13 of the U.S. Code. In the past, the Bureau resisted attempts to manipulate poverty statistics. The Census Bureau is

[5] The decennial census is of immense importance to political representation and federal funds distribution. The census' very importance virtually ensures that political groups will be vitally interested in the outcome of each decennial. The 1920 Census is a vivid illustration of the intense political interest in the census. The shift in the nation's population between 1910 and 1920 from rural areas and foreign lands to America's urban areas so disturbed the balance of power in Congress that the House of Representatives was never able to agree on a plan to reapportion itself. Congress essentially ignored the results of the 1920 Census and did not reapportion until after the 1930 Census. Congressional debate over the proper method of apportionment ultimately lead to request for a National Academy of Sciences report, the results of which became the basis of the reapportionment statute, 2 U.S.C. § 2a. Title 2 now provides for automatic reapportionment of the House of Representatives upon the reporting of the census numbers by the President to Congress.

staffed by many of the world's preeminent professional statisticians and demographers; it is a professional organization with a long history of scientific integrity. It is worth noting also that none of the myriad lawsuits brought after the last three decennial censuses resulted in the Census Bureau changing its final enumeration. The Census Bureau will continue to resist any attempts to manipulate its data or processes; accuracy will guide all operational decisions in Census 2000.

In fact, experts agree that the use of sampling in Census 2000 should minimize the opportunity for political manipulation, not increase it. Sampling has known, objective properties. The known properties of sampling are preferable to the certainty of missing several million people using traditional counting methods alone. In fact, uncontrolled error is more of a concern with a traditional headcount than it is with sampling.

The basic statistical framework for Census 2000 was developed by the Census Bureau in tandem with the Academy. The Academy study mandated by Congress in 1991 recommended the major innovations for Census 2000. Concluding that continued reliance on traditional enumeration methods was futile, the Academy recommended that the Bureau adopt both sampling for nonresponse follow-up and sampling with a very intensive quality check process to provide a statistical enumeration more accurate than is possible with a physical enumeration. The Census Bureau has spent the last five years turning the Academy's initial and ongoing recommendations into a detailed plan. The Bureau has also been working with its advisory committees, conducting public meetings, and having

discussions with Congress to refine the details of the plan.

The Census Bureau is committed to making its decisions on formulas in a very open process. This openness should prevent not only the possibility of surreptitious manipulation, but the perception of possible manipulation.

The Census Bureau has proposed to the National Academy of Science's Committee on National Statistics that it convene a fourth expert panel to guide the Bureau's work for Census 2000. This new group of outside experts would critically review the statistical procedures for the Census 2000, in particular the use of sampling for nonresponse follow-up and Integrated Coverage Measurement. These experts will comment on the planning process, suggest improvements and preferred approaches, and review other procedures that may be considered during the enumeration in order to increase accuracy. The panel will be established in the Fall of 1997 and continue its work through the Spring of 2001, with the reporting of census results for reapportionment and redistricting. This open, expert review will:

- assure the objectivity, scientific validity, and integrity of the 2000 Census,
- assist the Bureau in its goal of producing a more accurate Census, and
- improve understanding of how sampling and statistical estimation procedures contribute to achieving a more accurate Census.

The panel will consist of widely and highly regarded experts on census matters, statistical methodology, sampling, survey research, demography, and other social and behavioral sciences. The panel will interact with the Census Bureau as follows:

- Census Bureau will develop statistical procedures for Census 2000.
- The panel will convene periodic open workshops to review specific procedures, inviting other experts and various stakeholders to attend and critique the Bureau's procedures.
- Following each workshop, the Census Bureau will, as necessary, revise its planned procedures based on issues raised and suggestions made at the workshop and then resubmit the procedures to the panel.
- The panel will review the Census Bureau's revised procedures, other documentation, and the workshop proceedings and then issue its assessment of the specific procedures planned. These reports will be reviewed by the Committee on National Statistics, the Commission on Behavioral and Social Sciences and Education, and other expert groups in accordance with National Research Council procedures.
- The Census Bureau will finalize its procedures prior to the Census, based on the recommendations of the panel.

- During the conduct of the actual enumeration, the panel will review the statistical procedures as they are implemented, as well as other procedures that may be considered in order to increase accuracy.

The Academy Panel on Alternative Methodologies concluded that this process of outside peer review would remove potential objections to the use of sampling:

> If sound procedures are developed by the Census Bureau and communicated to users, the panel believes that it will be possible for the Bureau to address all reasonable potential objections to the uses of sampling and to satisfy users that the use of sampling has added to the soundness and quality of the 2000 Census, rather than detracting from it.

By mid-1998, the Bureau will make all its planned formuias available for scrutiny by the public, the professional statistical community, and the new Academy panel. The Bureau will consider all comments and criticisms for more than a year. Then, based on the best professional judgment at the time, the Census Bureau will announce and "lock in" its final set of formulas—well in advance of the collection of any data in 2000. Fears that the Census Bureau will collect data in 2000 and then use new formulas designed to achieve some purpose other than the most accurate census possible are completely without foundation.

X. LEGAL CONSIDERATIONS

The plan for Census 2000 is both Constitutional and legal.

The Assistant Attorney General for the Civil Division in the Bush Administration, Stuart Gerson, concluded in a July 9, 1991 opinion that the Constitution's requirement of an actual enumeration refers to the accuracy of the census, not to any particular method of census taking. In addition, the Assistant Attorney General concluded that the weight of caselaw on the Census Act does not prohibit adjustment. Mr. Gerson detailed his careful examination of the Constitution's requirement for an "actual enumeration" in testimony before the Senate Committee on Governmental Affairs on April 16, 1997. He explained that, at the time the Constitution was written, the term "actual" meant both "existing in act or fact" and "in action or existence at the time, present, current." He noted that Georgia was seeking representation in the Congress to be formed based on Georgia's expected population growth rather than its current population. He concluded that the term "actual" suggest the 'Framers' intent that the census be based on current population, as opposed to taking into account potential population growth. It does not appear to delimit the means by which an accounting of the currently existing population my be determined.

In evaluating the term "enumeration," Mr. Gerson similarly found no reason to favor sole reliance on physical enumeration to the exclusion of statistical sampling:

In sum, the essence of enumeration, as the term is both generally and constitutionally understood, is more likely found in the *accuracy* of census taking rather than in the selection of any particular method, i.e., a headcount. [emphasis added]

In 1994 the Department of Justice (DOJ) reviewed the Census Bureau's preliminary plans to use sampling in Census 2000 and issued a written opinion confirming that the plan was neither illegal nor unconstitutional. This DOJ opinion is premised on a long line of federal court cases holding that neither the Constitution nor the Census Act bars the use of sampling in a decennial census, so long as sampling is not used as a substitute for a traditional enumeration.

In addition, the Supreme Court recently resolved the most prominent case challenging the 1990 decennial Census, *Wisconsin v. City of New York*, 116 S. Ct. 1091 (1996). While the Court's opinion did not directly address the legality of sampling, the Court confirmed that the Secretary of Commerce enjoys broad discretion in the methods used to take the census. In the exercise of this discretion, the Census Bureau has determined that it cannot take the most accurate and cost effective Census possible without a limited, judicious use of sampling. The Bureau proposes to use sampling in Census 2000 as a complement to traditional methods used in enumeration, not as a substitute for these methods.

The Constitution requires that an "actual Enumeration" be conducted every ten years "... in such Manner as [the Congress] shall by Law direct." The actual enumeration requirement is not a requirement to conduct a headcount or physical enumeration. Courts

that have considered this issue have unanimously concluded that actual enumeration means that the decennial census must be as accurate at that time as possible, without reference to the specific method that is used.[6]

The Census Act, Title 13 of the United States Code, is the statutory vehicle through which Congress delegated responsibility for conducting the Census to the Secretary of Commerce. Section 141(a) requires the Secretary to take a decennial Census "in such form and content as he may determine, including the use of sampling procedures and special surveys. . . .", while Section 195 mandates that the Secretary "shall, if he considers it feasible, authorize the use of ... sampling . . ." except "for the determination of population for purposes of apportionment of Representatives." Courts have held that these provisions, taken together, evidence Congress' intention that sampling may be

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[6] *Young v. Klutznick*, 652 F.2d 617 at 625 (6th Cir. 1981) ("[A]lthough the Constitution prohibits subterfuge in adjustment of Census figures for purposes of redistricting, it does not constrain adjustment of Census figures if thoroughly documented and applied in a systematic manner."); *City of New York v. U.S. Department of Commerce*, 739 F. Supp. 761 at 767 (E.D.N.Y. 1990), rev'd, 34 F.3d 1114 (2nd Cir. 1994), 116 S. Ct. 1091 (1996), ("It is no longer novel, or in any sense new law to declare that statistical adjustment of the decennial Census is both legal and constitutional . . . ."); *Carey v. Klutznick*, 508 F. Supp. 404 at 415 (S.D.N.Y 1980) ("It appears to the Court that [the Constitution's requirement for an actual enumeration] indicates an intent that apportionment be based on a Census that most accurately reflects the true population of each state."); *City of Philadelphia v. Klutznick*, 503 F. Supp. 663 at 679 (E.D. Penn. 1980)("[I]t is inconceivable that the Constitution would require the continued use of a headcount in counting the population.").

used in a decennial Census so long as it is not a substitute for traditional methods of numeration.[7]

In 1994, DOJ specifically approved the Census Bureau's plan to use sampling in Census 2000, agreeing with the logic contained in the long line of court decisions holding that neither the Constitution nor the Census Act prohibits adjustment:

> [I]n requiring an '*actual*' enumeration, the Framers meant a set of figures that was not a matter of conjecture and compromise. . . . There is no indication that the Framers insisted that Congress adopt a 'headcount' as the sole method for carrying out the enumeration, even if later refinements in the metric of populations would produce more accurate measures. . . .
>
> . . . [T]he Census Act does not preclude the Bureau from engaging in statistical adjustments of the next set of decennial Census figures. . . . Its prohibition on 'sampling' in decennial Censuses appears to have meant only that while a procedure relying on 'sampling' alone might be the most cost-effective means to discover the information sought in a mid-decade Census, the Bureau should not rely on 'sampling' as its *exclusive* method of tabulating population figures in the decennial Census. . . .

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[7] *City of New York v. U.S. Dept. Of Commerce*, 34 F.3d 1114 at 1125 (2nd Cir. 1994), rev'd on other grounds, 116 S. Ct. 1091 (1996) ("statistical adjustment to the initial enumeration is not barred by the Census Act and indeed was meant to be encouraged."); *Carey v. Klutznick*, 508 F. Supp. 404 at 415 (S.D.N.Y. 1980) ("the Census Bureau [is authorized by § 195 to] . . . utilize sampling procedures but only in addition to more traditional methods of enumeration."); *Young v. Klutznick*, 497 F. Supp. 1318 at 1335 (E.D. Mich. 1980) rev'd on standing, 652 F.2d 617 (6th Cir. 1981) ("All that § 195 does is prohibit the use of figures derived solely by statistical techniques. It does not prohibit the use of statistics in addition to the more traditional measuring tools to arrive at a more accurate population count.").

This 1994 opinion is in accord with earlier DOJ opinions holding that the Department of Commerce could have adjusted the 1980 and the 1990 Censuses, had it determined that adjustment was feasible and proper.

Finally, some have contended that being counted in the census is like voting, and each individual can decide for him or herself whether to participate in the political process by being counted. This argument not only fails to recognize that children under the age of 18 accounted for more than half of the undercount in 1990, but also fails to comprehend the Census Bureau's constitutional mandate. Article I, Section II of the Constitution, as amended by the Fourteenth Amendment, commands that representatives be apportioned based on the "whole number of persons in each State", not the number of persons in each state who choose to participate in the political process. The apportionment situation at the time the Constitution was adopted makes clear that the Framer's intent was to count all living persons in the United States, not all voters or all citizens. At the time the Constitution was adopted, women were not permitted to vote; children and slaves were in no position to "stand up and be counted." All were nonetheless enumerated for apportionment purposes, with slaves being counted as 3/5 of a person until passage of the Fourteenth Amendment in 1868. The Constitutional command to the Census Bureau is

clear—to secure the most accurate enumeration possible of all persons regardless of status, so that Congress can reapportion itself fairly. The Census Bureau's goal is to find and enumerate all persons resident in the United States on Census Day, 2000.

The legal authorities are clear—neither the Constitution nor the Census Act precludes the use of sampling. The Census Bureau, following the Congressionally-mandated recommendations of the National Academy of Sciences, has determined that Census 2000 would be rendered more accurate and more cost-effective by the introduction of a limited use of sampling in addition to a traditional methods of enumeration. The Supreme Court has held that the Census Bureau enjoys broad discretion in the methods it uses to take the census. The decision to use sampling as planned in Census 2000 is a rational decision and falls well within this discretion.

GLOSSARY OF TERMS

Computer Assisted Telephone Interviewing (CATI)

A method of data collection using telephone interviews in which the questions to be asked are displayed on a computer screen and responses are entered directly into the computer.

Data Access and Dissemination System (DADS)

A generalized electronic system for all access and dissemination of Census Bureau data. This inteactive electronic system will be designed to allow efficient and cost-effective access to data summaries generated by the various censuses and other programs of the Census Bureau. DADS will serve as the vehicle for accessing and disseminating data from Census 2000 and from the American Community Survey.

Demographic Analysis (DA)

Demographic Analysis is one of the methods the Census Bureau uses to measure coverage at the national level. It differs from survey coverage estimates, such as PES and ICM, in that it does not rely on case by case matching of census records. To produce an estimate of the total population, DA relies on administrative records to provide estimates of births, deaths, immigration, and emigration. DA provides estimates on the national level only.

Dual System Estimation (DSE)

The estimation methodology used for Integrated Coverage Measurement.

Geocoding

The assignment of an address, structure, key geographic location, or business name to a location that is identified by one or more geographic codes.

Group Quarters

A facility where people live that is not a typical household-type living arrangement. The Census Bureau classifies all individuals not living in households as living in group quarters. There are two types of group quarters: institutional (for example, correctional facilities, nursing homes, and mental hospitals) and noninstitutional (for example, college dormitories, military bases and ships, hotels, motels, rooming houses, group homes, missions, shelters, and flophouses).

Heterogeneity

Heterogeneity occurs when blocks of housing units assigned to sampling strata or groupings are not similar in terms of the likelihood of being included or missed by the census. Heterogeneity creates difficulty for the small area estimation process because the correction factor gets applied to all people with the specified characteristic in that sampling poststratum, even though some of them do not actually have the coverage characteristics.

Homogeneity

The assumption of homogeneity expects that all people in a particular sampling stratum or grouping will be very much alike in terms of their likelihood of being included or missed by the census. The grouping of

people in a particular stratum is called poststratum, such as all white, non-Hispanic male renters ages 18-22 in a rural area. A lack of homogeneity in a particular sample block is not an error, but it does create difficulty for the small area estimation process. This happens because the correction factor gets applied to all people with the specified characteristic in that poststratum, even though some of them do not exhibit the same coverage characteristics.

Housing Unit

A housing unit is a house, an apartment, a mobile home or trailer, a group of rooms, or a single room occupied as a separate living quarters, or if vacant, intended for occupancy as a separate living quarters. Separate living quarters are those in which the occupants live separately from any other individuals in the building and which have direct access from outside the building or through a common hall. For vacant units, the criteria of separateness and direct access are applied to the intended occupants whenever possible.

Imputation

When information is missing or inconsistent, the Census Bureau uses a method called imputation to assign values. Imputation relies on the statistical principle of "homogeneity," or the tendency of households within a small geographic area to be similar in most characteristics. For example, the value of "rented" is likely to be imputed for a housing unit not reporting on owner/renter status in a neighborhood with multi-units or apartments where other respondents reported "rented" on the census questionnaire. In past censuses, when the occupancy status or the

number of residents was not known for a housing unit, this information was imputed.

Integrated Coverage Measurement (ICM)

A coverage measurement methodology that will be used to determine the number of people and housing units missed or counted more than once in Census 2000. This information is combined with the initial data collection results before producing a single set of official census results (the one-number census).

List/enumerate

A method of data collection in which temporary field staff, called enumerators, list each residential address, spot the location of each on a census map, and interview the residents of the household during a single visit. This completes the census address list for these areas and provides the information needed to update the TIGER data base and Master Address File (see definitions below).

Local Update of Census Addresses (LUCA)

A Census 2000 program, established in response to requirements of P.L. 103-430, that provides an opportunity for state, local, and tribal governments to review and update individual address information in the MAF and associated geographic information in the TIGER data base before using the addresses for questionnaire delivery to improve the completeness and accuracy of both computer files and the census.

Master Address File (MAF)

A computer file based on a combination of the addresses in the 1990 census address file and current versions, supplemented by address information provided by state, local, and tribal governments. The MAF is being updated throughout this decade and the next to provide a basis for creating the Census 2000 address list, the address list for the American Community Survey, and the address list for the Census Bureau's other demographic surveys.

Nonresponse Follow-up

A census follow-up operation in which temporary field staff, known as enumerators, visit addresses from which no response was recieved.

Nonsampling error

Errors that occur during the measuring or data collection process. Nonsampling errors can be the most serious types of errors because they yield *biased* results when most of the errors distort the results in the same direction. Unfortunately, the full extent of nonsampling error is unknown. Decennial censuses traditionally have experienced nonsampling errors, most notably undercount, resulting from people being missed in the enumeration processes.

Post-Enumeration Survey (PES)

The 1990 Post-Enumeration Survey (PES) was designed to measure net coverage errors in the 1990 census. The PES evaluated coverage in the 1990 census

on a case-by-case basis using the Dual System Estimation (DSE) methodology.

Poststratum

Information about the current occupants of each housing unit in the ICM survey found *during* the ICM interview, is used to form groupings called "poststrata." This information, including the age of respondent, current owner/renter status, and so forth, is used to form homogenous groupings and improve the estimation process. By contrast, the initial ICM strata will be formed using aggregate information about each block as of the 1990 census.

Program for Address List Supplementation (PALS)

A program providing all governmental units and regional and metropolitan agencies the opportunity to submit lists of individual addresses for their community to the Census Bureau for use in building the MAF. Ongoing submissions and feedback between the Census Bureau and local governments on this program, enabled by the Census Address List Improvement Act of 1994 (P.L. 103-430) will help ensure the completeness and accuracy of the MAF and the TIGER data base.

Quality Assurance (QA)

Quality assurance represents a broad philosophy and specific procedures that are designed to: build quality into the system, constantly improve the system, integrate responsibility for quality with production.

Sampling Error

Errors that occur because only part of the population is being contacted directly. With any sample, differences are likely to exist between the characteristics of the sampled population and the larger group from which the sample was chosen. However, sampling error, unlike nonsampling error, is readily measured.

Service-based enumeration (SBE)

An operation designed to enumerate people at facilities where they might receive services, such as shelters, soup kitchens, health-care facilities and other selected locations. This operation targets the types of services that primarily serve people who have no usual residence.

Special Place

An institution that includes facilities where people live or stay other than the usual house, apartment, or mobile home. Examples are colleges and universities, nursing homes, hospitals, and prisons. Often the facilities that house people are group quarters, but they may include standard houses or apartments as well.

Sampling Stratum

A sampling stratum, as used in the ICM, is a grouping or classification that have a similar set of characteristics, based on the 1990 census. For example, one might define a stratum as: all blocks in large central cities with a 1990 census population that was 30 percent or more Black renters.

Topologically Integrated Geographic Encoding and Referencing (TIGER)

A computer data base that contains a digital representation of all census-required map features (streets, roads, rivers, railroads, lakes, and so forth), the related attributes for each (street names, address ranges, etc.), and the geographic identification codes for all entities used by the Census Bureau to tabulate data for the United States, Puerto Rico, and the Island Areas. The TIGER data base records the interrelationships among these features, attributes, and geographic codes and provides a resource for the production of maps, entity headers for data tabulations, and automated assignment of addresses to a geographic location in a process known as "geocoding."

Telephone Questionnaire Assistance (TQA)

A toll-free service that will be provided by a commercial phone center to answer questions about Census 2000 and the Census 2000 questionnaire, and to take interviews from people who prefer to be interviewed over the telephone.

If you want a copy of any of the following reference materials, please call the Census Bureau at (301) 457-2131.

Modernizing the U.S. Census, National Research Council, 1995

Preparing for the 2000 Census, Interim Report II, National Research Council, Committee on National Statistics, 1997

Census 2000 Operational Plan, U.S. Bureau of the Census, 1997

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Census 2000 Operational Plan

April 1998 (Revised)
U.S. Department of Commerce
Economics and Statistics Administration
BUREAU OF THE CENSUS

CENSUS 2000 OPERATIONAL PLAN

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The Census 2000 Operational Plan is subject to change based upon Congressional funding and questionnaire content changes, the results of our testing and research, the advice generated from our ongoing consultation process with stakeholders, and on what occurs as we begin operationalizing and implementing the plan's specific elements.

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Section I. Objectives and Strategies

CENSUS 2000 OPERATIONAL PLAN

I. OBJECTIVES AND STRATEGIES

The next census of the United States' population and housing will be conducted as of April 1, 2000. Reflecting a long tradition, Census 2000 will be the 22nd decennial enumeration in an unbroken chain that our Nation has undertaken. In many significant respects, however, Census 2000 will deviate sharply from tradition. As this Nation moves forward into a new century, the decennial census also must move forward. The Census Bureau has developed a plan for conducting Census 2000, incorporating many new features that address the two concerns that many people had about the 1990 census: that it cost too much and that it did not include everyone. The Census 2000 operational plan redesigns the census process in bold and fundamental ways.

From apportioning the U.S. House of Representatives to providing the data used by communities, businesses, and Americans everywhere, the decennial census is the cornerstone of our knowledge about our Nation. The census is the only data gathering operation in the United States that is mandated by the Constitution and the only one that produces a broad array of information on the American people and their housing at the smallest geographic levels.

Objectives of Census 2000

The goal of every census is to be the best census ever. So it is with Census 2000. The Census 2000 operational plan contains strate gies to improve the completeness and reduce the cost of the census. The following objectives are fundamental to our efforts:

- Make unprecedented efforts to count every household and person—from simpler, user-friendly forms to the better design of census operations
- Maintain an open process that diverse groups and interests can understand and support
- Eliminate the differential undercount of racial and ethnic groups
- Produce a "one-number" census that is right the first time

Four Strategies for Fundamental Change

The Census Bureau's operational plans for Census 2000 are built around four fundamental strategies for change:

- *Strategy One:* ***Build Partnerships at Every Stage of the Process***

The Census Bureau cannot accomplish its goals alone. So for Census 2000, we are reaching out and forming partnerships to help us accomplish our objectives. We need to think in terms of every activity being done by a "best in class" provider. This means the Census Bureau must build:

- **Partnerships with state, local, and tribal governments**. These governments know their local conditions and circumstances better than the Census Bureau. They can help us correct our maps and address lists, and tell us where to put unaddressed questionnaires, called "Be Counted" forms, in locations where people will find them. They also can alert us to problems and advise us of opportunities to publicize Census 2000. The law now allows us to let these governments review our address lists—while maintaining their confidentiality—and get their input.

- **Partnerships with community groups**. These groups know their constituents better than either the Census Bureau or any other governmental office. The groups can alert us to the best ways to communicate with their constituents to ensure they are included.
- **Partnership with the U.S. Postal Service (USPS)**. For Census 2000, the Census Bureau will use address information provided by the USPS to enhance our comprehensive address file. The USPS also will deliver census questionnaires to over 80 percent of the addresses nationwide.
- **Partnership through privatization**. To be "world class" in every stage of the census, we will award contracts to private sector partners, including:
  - **Advertising and promotion**. We will use private companies to manage our efforts to promote the census more visibly and effectively.
  - **Facilities management**. We will contract with data processing companies to manage the facilities where completed census forms are translated into computer files.

- *Strategy Two:* ***Keep It Simple***

The simpler and easier Census 2000 is, the greater the response, and the more accurate and less expensive it will be. Simplicity is the goal for every part of the process. For example:

- **User-friendly forms**. Our modern, powerful computer systems will allow us to use forms that are easier to read and complete. Moreover, because everyone is deluged with junk mail, Census 2000 questionnaires must be attractive, motivating (by explaining the benefits and mandatory nature of the census), easy to understand, and simple to fill out. The Census 2000 forms will stand out because they will carry a well-publicized "census" identity. Private designers are working with us to simplify the forms and implement the user-friendly features demonstrated in our testing and research to increase response.

- **Multiple contacts**. We also have learned from our testing and research that repeated contacts and reminders pay big dividends in response rates. So for Census 2000, we will implement a multiple mail contact strategy. The first contact with each address will be a letter that alerts the recipient to the census and its benefits. A few days later, a census questionnaire will arrive, noting that "your response is required by law." Shortly thereafter, a postcard will arrive thanking those who have participated and reminding others to do so.

- **More ways to respond**. Our first priority is to deliver a census questionnaire at each address. For the first time, however, we also will place unaddressed Be Counted questionnaires in locations such as community centers, Walk-in Questionnaire Assistance Centers, tribal offices, etc., for pick up and completion by people who believe that they have not been counted in the census. There will be a well-publicized toll-free telephone

number for respondents to respond on the telephone. We also plan to mail census forms in another language to households in areas where a significant number of people speak the other language, along with an English-language questionnaire.

- **Other simplified procedures**

  - A new method will ensure that Census 2000 finds people—such as those with no usual residence —at shelters, soup kitchens, and other places where they obtain services.

  - Special targeted methods will improve the count for population groups and in areas that historically have had large undercounts. One example is enlisting community leaders to designate neighborhoods where English is not the primary language for the Census Bureau to include as part of the targeted initial mailing of non-English questionnaires.

- Strategy Three: **Use Technology Intelligently**

  Dramatic advances in computing will allow Census 2000 to be simpler, less costly, and more accurate. For example:

  - **Digital "capture" of forms**. In Census 2000, for the first time, we will scan most of the completed questionnaires directly into computers that read handwriting. The completed forms will be read directly into computer files that will be used later for tabulation.

  - **"Matching" software**. Sophisticated computer software will allow us to spot multiple responses from the same household. For example, if one

spouse returns a regular questionnaire by mail while the other fills out a Be Counted questionnaire, we will be able to determine that both records come from the same household.

- **"Point and click" data tabulation**. Data seekers will be able to find the information they want from Census 2000. "Point and click" computing from our new DADS system will allow them to select the specific information they want, instead of thumbing through census reports that may or may not have the answer they are looking for.

- Strategy Four: **Use Statistical Methods**

Sampling and statistical estimation have been an integral part of the census process since 1940. At one time, the census asked every household for all the census information; now, most census questions are asked of a sample of households.

In 1990, respondents who did not return their census forms by mail cost the Census Bureau more than those who did, since temporary census workers were needed to conduct personal visits with nonresponding households. Statisticians agree that incorporating widely accepted statistical methods into Census 2000 will produce better results at less cost. So for Census 2000, we will make every attempt to find everyone. Some households, however, will neither mail in nor phone in their response. So we will use personal visits to obtain responses from the remaining addresses, to ensure that we directly contact at least 90 percent of the households in each census tract.

Using sampling to gather information on nonrespondents will ensure that Census 2000 is built on a solid core of responses. It will ensure that we can complete

our personal visits with no loss of accuracy but with substantial savings of time and money. Sampling will allow us to make scientific estimates of the population for the final 10 percent of the housing units.

Our experience in the last six decennial censuses has demonstrated that having responses from 100 percent of the housing units does *not* ensure inclusion of 100 percent of the population. People are left out for many reasons, and our objective is to account for everyone.

To check the quality of our work and to reach our goal of accounting for 100 percent of the population, we will take an independent sample—of about 750,000 housing units—of the total population and conduct a second interview. We will use the information from the second interview as the basis for quality checking all our results: the results from the mail returns, the Be Counted program, telephone interviews, and personal followup visits. This quality check survey, also known as the Integrated Coverage Measurement Survey (ICM), will lead to a "one-number" census and will eliminate the need for subsequent adjustment of the decennial count. We will use demographic analysis to validate the results.

By using both kinds of sampling—that is, sampling for nonresponse and for the ICM survey—the accuracy of Census 2000 will be very high for all states, congressional districts, and other populous areas.

There always will be some uncertainty surrounding population totals for some smaller areas, such as census blocks, census tracts, or small communities. Unlike previous censuses, for Census 2000, we will have estimates of the uncertainty resulting from

sampling for all areas. The totals for historically undercounted areas will be much better than those obtained from using traditional methods.

Effective Management Tools

The Census Bureau has instituted several management initiatives—such as the following—to facilitate a more effective and efficient planning process for Census 2000 as well as its actual implementation:

- A sophisticated electronic Management Information System, with a Master Activity Schedule component and a Cost and Progress component, will provide information on scheduled dates, responsible organization, budget, cost to date, and current progress for Census 2000 operations. This system provides decision support functions, such as critical path analysis and what-if analysis.
- The Commerce Administrative Management System is a modern electronic financial management system which, among other features, provides up-to-date financial data available for on-line query as well as paperless processing for purchase orders and payments.
- The Census 2000 Cost Model provides an automated means to estimate staffing and budget requirements for Census 2000 based on a well-defined set of activities specific to the major components of census operations. The Cost Model tool used to prepare the cost estimates for the budget process. It also is used to answer inquiries from Congress, the Department of Commerce, the Office of Management and Budget, senior managers at the Census Bureau, and our stakeholders.

Using the various innovative and cost-saving methods that center around the four strategies for conducting Census 2000, as well as the improved management of census operations, cost modeling techniques have estimated the cost of Census 2000 to be less than if the 1990 census design were repeated in 2000.

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Section II. Content of the Report and Overview of Census 2000 Operations

II. CONTENT OF THE REPORT AND OVERVIEW OF CENSUS 2000 OPERATIONS

CONTENT OF THIS REPORT

This report presents the objective, major features, and milestone dates for each major element of the operational plan for Census 2000. The milestone dates shown in each section are presented in terms of months of the calendar year and, sometimes, in terms of exact days. Questions or comments relating to specific aspects of the operational plan may be directed to the appropriate person listed in Appendix B, "Key Census Bureau Telephone Contacts."

The census design upon which this plan is based employs statistical sampling to supplement traditional enumeration methods while improving quality and containing census costs. In additional to continued planning and preparation for the current census design, the Bureau of the Census is designing a Census 2000 process that does not employ the expanded statistical methods. The detailed plans for this "non-sampling" census will be documented as they become available.

OVERVIEW OF CENSUS 2000 OPERATIONS

CURRENT STATUS

Census 2000 will enumerate the residents of the United States as of April 1, 2000. Since the first census in 1790, the major phases of the census—planning and preparation, data collection and processing, and dissemination of results—have remained the same. Over time, however, the operational components of these phases have changed greatly. Changes have reflected the characteristics of our society, advances in technology and methodology, and experience gained in previous censuses. This overview describes major elements

of the preparatory, data collection, data processing, and dissemination phases of the *current design* of Census 2000. Figure II-1 depicts the key operations in each of these phases. The bottom layer of blocks shows activities comprising the preparatory phase, which provide a broad and firm foundation for effectively supporting successive steps in the census process. The next set of blocks shows major data collection activities, and the third layer represents data processing steps, including the capture of information provided by the public. The top block shows the data dissemination phase, representing the goal of producing statistics that will serve our Nation well.

Figure II-1. Census 2000 Process

(CHART OMITTED)

The design of Census 2000 reflects a balance between two different approaches to assuring a complete enumeration of the population:

- One is the "traditional" approach used in all previous censuses. The traditional approach is to count each person, household, and housing unit by direct contact to the greatest extent possible. For Census 2000, we have intensified our efforts to encourage participation by expanding and improving ways for everyone to become aware of the census and provide information about themselves and their households.
- The second approach is to use statistical methods, especially sampling, to a greater degree than in past censuses. These statistical methods will address problems with the timing and accuracy of past censuses that will not be solved even with expanded efforts using traditional methods.

The current census design uses the traditional approach for the first several weeks of the enumeration process, and then turns to the second approach to compensate for deficiencies in the first. The operations described in this document have been defined, planned, funded and scheduled to integrate these two approaches and result in the single set of results that characterize the "one-number" census.

The remainder of this section provides an overview of the preparatory, data collection, data processing, and dissemination phases of the current design of the Census 2000. It provides a context for the remainder of the document by showing how each major element of the census relates to others. As each individual element is

described, we provide a reference to the subsequent section in this plan which provides more detail about it.

This overview first summarizes operations conducted during the data collection, data processing, and tabulation phases of the census. Having provided the context of those activities, it then describes the preparatory phase of the census, where the foundation of the other phases is laid.

DATA COLLECTION, DATA PROCESSING, AND DISSEMINATION

The major enumeration activities for the Census 2000 occur between April and September. Throughout the period of data collection, there is a parallel period of data processing where the information is entered into the computer and checked. These data processing activities support enumeration by identifying areas where information is missing or incomplete. Once data collection is complete, data processing continues to assure the accuracy of the census results. The final product from data processing is complete files of characteristics for each person in the nation and for enumerated housing units. Tabulations from these files are used to produce census results that will be used for many purposes.

BASIC DATA COLLECTION

Just before April 1, 2000, most of the households in the United States will receive a questionnaire on which their residents will be enumerated in the census.

- For just over 80 percent of all households, the United States Postal Service (USPS) will deliver census questionnaires. Household residents will be asked to fill out their questionnaire and mail it back to the Census Bureau. This procedure,

known as **mailout/mailback** (See section IX.A), covers most areas that have city style addresses (a house number and street name).

- For the vast majority of the remaining households, a census worker will leave the questionnaires, while updating the list of addresses for the area. This procedure is known as **update/leave**. (See section IX.A) Again, household residents will be asked to fill out the questionnaire and mail it back to the Census Bureau.
- In the remaining areas, which are sparsely settled or remote, census workers collect information directly. These **list/enumerate** procedures are described further in section IX.A.
- Additional or modified procedures are used to ensure the complete enumeration of particular persons and areas:
  - Modified procedures are used to enumerate persons in special living situations. These procedures are described in sections IX.D and IX.E.
  - Various special procedures will also be used in areas where extra effort to complete the enumeration is needed. These procedures are described in section IX.F.
  - Basic census procedures will be tailored to conduct the best possible enumeration of American Indian and Alaska Native Areas and in Hawaiian Homelands. Planning for all aspects of the census in these areas is described in section X.

  - Slightly different procedures are used in Puerto Rico and the Island Areas. These procedures are referenced in sections XIV. and XV, respectively.

As questionnaires are returned by mail or by census workers, they will be checked-in against the list of those sent out. The handwritten information on the forms will be converted to computer-readable form, and the data will be checked by computer to determine whether we received information for all persons in the household. We will attempt to contact households where one or more persons, or their data, may be missing. These contacts, by mail or telephone, are described in Sections IX.H and IX.J, respectively.

During the period of time when questionnaires are being returned, we will provide opportunities for people to be counted if they feel they did not receive a questionnaire, or that they were not included on their household's questionnaire, or that they would not otherwise be counted for any reason. These opportunities are greatly expanded and intensified compared to previous censuses, where we assumed that everyone would receive a census questionnaire in the mail and be enumerated with an appropriate household. For Census 2000, people will be able to pick up a "Be Counted" census form (See section X.C) in a convenient location and mail it back to us. In addition, they will be able to use our Telephone Questionnaire Assistance service to answer questions about filling out the form, or to provide their information over the phone. (See section IX.B) We will inform the public about these opportunities through a strong marketing campaign and a network of partnerships established with community organizations; state, local, and tribal governments; and

others that can help encourage their constituencies to participate in the census.

SAMPLING FOR NONRESPONSE AND THE VACANT HOUSING UNIT CHECK

Even with our unprecedented efforts to encourage everyone to provide information by mail or telephone, some persons and households will not do so. About 2 weeks after Census Day, we will determine the percentage of returned questionnaires (the mail response rate) for each census tract. We will then select a sample of addresses without returned questionnaires and send census workers out to visit and enumerate at those addresses. This operation is called Nonresponse Followup. (See section IX.K) The rate at which the sample is selected will ensure that at least 90 percent of the housing units in the tract have completed census forms.

During the time period between Census Day and visits to the sample of nonresponding addresses, census workers visit a sample of those housing units identified by the Postal Service as likely to be vacant. This operation is called the Vacant Housing Unit Followup. (See section IX.G) Past experience shows that a small but significant portion of these units are, in fact, occupied, so this visit accounts for people who may be living there and who did not get a census questionnaire.

INTEGRATED COVERAGE MEASUREMENT

Up to this point, we will have used all available methods to encourage people to participate in the census. Subsequently, we will have visited a sample of nonresponding households to collect information that can be used to estimate the number and characteristics of persons of all persons who would have been followed up

under previous census procedures. However, as in past censuses, there will still be significant numbers of persons who are not represented in the census enumeration. These are people with unusual living situations, transient status, or other characteristics for whom even expanded enumeration opportunities fail to work. Because we know that people will still be missing, we will conduct an additional major check for quality called the Integrated Coverage Measurement (ICM) Operation. (See section IX.L) The ICM is a large-scale sample survey conducted independently of earlier census operations. By matching the results of the ICM to the results of those earlier operations, we will provide an estimate of the total population of the nation that is more complete than either. The ratio of the estimate of the complete population to the results of the earlier operations will be calculated for various population groups to produce a sound statistical estimate of the population for the Nation, States, and for small areas.

Because the final "one number" census results are statistical estimates, they may differ from what they would have been if we had been able to enumerate each person directly. We will provide estimates of their coefficient of variation (CV), a measure which indicates the amount of difference that has occurred. The effects of combining the responses to the census, the data from the nonresponse followup, and data from the ICM are described in section IX-M. Independent estimates that can be used to validate the "one number" census results will be provided from an approach called Demographic Analysis. (See section IX.N)

DATA PROCESSING

As described above, the information supplied by respondents will be entered into computers concurrent with field operations. The data are then processed to assure their accuracy and completeness. For example:

- The computer will check each questionnaire to determine if there is any indication that one or more persons may be missing. Whenever there is such an indication, we will follow up by mail or telephone to add people as appropriate.
- When we receive Be Counted forms in the mail or census information over the phone, we will compare (match) that information to the information on mail returned questionnaires to make sure that people are not counted more than once. (See section IX.I)
- Computer checks are also done to determine how complete the data for each person are. These edits locate questionnaire items with missing data and use statistical techniques to "impute" values based on characteristics of similar households.

All of these operations help ensure that there is one record for each person in the census, and that their data records are complete.

Another set of processing operations ensures the integrity of the list of addresses and the housing units associated with them. There are several census operations that identify needed changes to our list of addresses. Whenever we identify new housing units or those that no longer exist, we must update our files. Processing these changes is a continuing operation involving data capture of changed addresses and locations and, if needed, changes to our geographic database.

DISSEMINATION

Once the final population counts have been processed, we are ready to provide the data. The first set of data produced from the census are the state totals to be provided to the President by December 31, 2000. These counts are used to reapportion the seats in the U.S. House of Representatives. Between that date and April 1, 2001, we will provide tabulations to each state so that they can redraw Congressional, state, and local legislative districts. The boundaries of areas for which redistricting data are provided are identified through partnerships with state officials, an effort that begins several years before Census Day. (See section XII.B)

Most of the data from the census will be tabulated and disseminated electronically using the newly-developed Data Access and Dissemination System (DADS). (See section XII.A) This system will use new technology to provide fast and flexible access to census data for a wide array of data users. In addition to tabulations, we will provide a full range of maps and other geographic products in hardcopy and digital form. (See section XII.C)

PLANNING AND PREPARATION

The previous section summarized the activities that take place to enumerate the population and produce census data. To ensure their accomplishment, there is a lengthy and complex period of preparing for all of the people, systems, and materials needed to make the census successful. Long before Census Day, we need to:

- *Promote awareness of the census and its importance because the success of the census depends greatly on the cooperation of the American public.* Our unprecedented efforts to promote and publicize

the census include working with the media, state and local governments, and organizations who can encourage their constituents to participate. A paid advertising campaign will be coupled with a variety of special targeted activities to make as many people as possible aware of the importance of the census and the many ways of providing their information. Our partnerships with governments and organizations recognize their expertise about the best ways to involve the people they serve. (See section IV)

- *Determine the questions that will be asked of each person for themselves, other household members, and their living quarters (See section V.A) and design the questionnaires so that they will provide accurate and complete information.* We need to arrange for the questionnaire packages, including envelopes, to be printed, assembled, and delivered by the United States Postal Service or census workers on a precise schedule. To encourage as many households as possible to return their questionnaires, we will also send an advance notice of the census before the questionnaires are mailed, and a thank you/reminder postcard shortly after the questionnaires are mailed. (See section V.B)

In 2000, as in every census since 1940, a sample of households will be asked to respond to more questions than other households. Most households will receive a "short form," but this sample will receive the "long form." The sampling rate will vary across different geographic levels, with about one out of every six households receiving the long form overall. (See section V.D)

In addition to the census questionnaires and mailing packages, a number of other data collection forms must

be designed, produced, and provided to support special data collection efforts. (See section V.C)

- *Compile lists of addresses and other identifying information about housing units and other places where people live or could live.* Different procedures to compile address lists are used in areas where the United States Postal Service delivers the questionnaires and areas where census workers deliver them. (See sections VI.A and VI.B, respectively). Once compiled, all of these addresses form the Master Address File (MAF), which must be complete and accurate to help assure that the census results are complete and accurate. For both types of areas, the process of compiling the lists of addresses begins long before Census Day, and several phases of updating take place using information from the United States Postal Service, local and tribal governments, and census workers. (See sections VI.C., VI.D, and VI.E, respectively) Each of these sources provides unique and important contributions to the accuracy of the information on the address lists. Equally important, a unique location description must be associated with each address. These locations are important so that census workers can find addresses during field visits, and so that data provided by respondents in multiple ways, as well as the results of the Integrated Coverage Measurement Survey, can be matched efficiently. In areas with city style addresses, the address itself provides a unique location description, but in other areas, a person must visit the living quarters and describe it in words and by "spotting" it on a map.

Our tool for identifying the spatial location of living quarters and the other geographic information

necessary for producing maps and census tabulations is a data base called TIGER®*. (See section VII) The TIGER data base, which accounts for the entire area of the country, initially was developed during the 1980's and is updated continually. It contains information on physical features including their names and attributes (for example, the address range associated with a street segment), the boundaries of legal, administrative, and statistical geographic entities, and other relevant data. Using the TIGER data base, we can associate each address in the Master Address File with its corresponding record in TIGER to produce address files or listings and accompanying maps for use in census operations and to tabulate the census results. Throughout the decade and especially during the census, the address list and the TIGER data base are linked and updated to ensure that both are kept current and consistent.

- *Establish an extensive set of temporary offices to support the conduct of data collection, data capture, and data processing operations.* Data collection offices and Data Capture Centers will manage the massive recruiting efforts needed to conduct census operation, report progress, and transmit completed work. Establishing the infrastructure for these offices requires long lead times in order to find and configure space; purchase equipment, furniture, and supplies; and recruit and train census workers for temporary positions. (See section VIII.A)

  Precensus address listing operations will be managed by a network of Census Field Offices (CFO's), and data collection operations will be

managed by a network of Local Census Offices (LCO's). All of these offices will report to Regional Census Centers in the same cities where the Census Bureau's permanent Regional Offices are located. The decentralized networks of offices will be responsible for recruiting and managing staff for all field operations. Their establishment and management will be performed by Census Bureau staff.

Data Capture Centers will be located in four areas of the country, one of which is the Census Bureau's permanent data processing facility in Jeffersonville, Indiana. Permanent Census Bureau staff will establish and manage activities in Jeffersonville, which will perform both the same data capture functions as the other Centers and several post-census processing operations after the other Centers close. Responsibility for establishing and managing the other three Data Capture Centers, and for their equipment, software, and technical maintenance of equipment, will be contracted out. Contractors will be responsible for: (1) checking in census questionnaires by comparing identifying information on them to the Master Address File; (2) preparing the questionnaires for data capture; (3) capturing the data by scanning the questionnaires using electronic imaging; (4) keying of data as necessary; and (5) ensuring the consistency of data files with the actual respondent-supplied information. The completed capture files will be trans

*TIGER® is a registered trademark of the U.S. Bureau of the Census. For ease of presentation, the trademark symbols for TIGER and TIGER-related products are omitted from the text.

mitted to headquarters for the operations needed to provide a final file of detailed census data. (See section XI.B)

Computer specialists at Headquarters, who work closely with statisticians and subject matter experts, will have designed an automated data processing system that supports preparatory activities, operates concurrently with capture operations during data collection, and processes the captured data. During the preparatory phases of the census, this system will support all activities related to building the address list and using the list for mailing questionnaires, selecting the sample of long form questionnaires, and providing control files for field data collection and data capture. During census data collection and capture operations, these headquarters processing systems will match and unduplicate responses for people who may otherwise be counted more than one time, and select the samples for nonresponse followup, the vacancy check, and the Integrated Coverage Measurement Survey. After data collection and capture, these systems will perform final edits to ensure complete information for and about each person, conduct statistical estimation and variance procedures, and format complete data files to be used to produce census results in a variety of media. (See section XI.C)

Recruiting temporary staff for census operations, in particular data collection, will require hiring almost a half million people for census jobs. Before hiring people, the Census Bureau will test them, make sure they meet other requirements, and screen them for criminal histories. (See section VIII.B)

Telephone Questionnaire Assistance will be performed under contract. The contractor will conduct operations to answer questions about the census questionnaire and take information from respondents over the telephone, under the direction of Census Bureau staff.

A sophisticated and extensive telecommunication network will support all communication among the public, our decentralized offices, and Headquarters. (See section XI.A)

Because the census must provide high quality information, it is critical that each operation that contributes to the accuracy of that information be performed well. Detecting and correcting errors that might otherwise be introduced is accomplished using Quality Assurance (QA) procedures. The operations for which QA procedures will be implemented are described in Section XIII.C.

- *Design a system to produce tabulations and other data products from the census.* Our first products will be the state counts for the President, and block level data for the states. We will work with data users to define other basic products, and are developing DADS for online timely access to all census data.

TESTING, DRESS REHEARSAL, EVALUATION AND RESEARCH

As mentioned earlier, we are conducting a Dress Rehearsal of Census 2000 methods and procedures during 1998. The design of the Dress Rehearsal was based on testing and research conducted earlier this decade to address problems identified in the 1990 Census. (See sections XIII.A and XIII.B) Continual improvement in the census process will again rely on Census 2000, which will include several studies to evaluate census quality and provide information for future census planning. (See section XIII.D.) In fact, planning for the 2010 Census has already begun, as described in Section XIII.G. Research and development efforts for 2010 will take advantage of the Dress Rehearsal and Census 2000 to provide a useful context for testing. For example, data from the Dress Rehearsal and Census 2000 (as well as other sources) will be used to explore the feasibility of using administrative records for a decennial census. (See section XIII.F) And, ideas for research studies and experiments to develop future census methods will be considered in planning the 2000 Census. In this way, the Census Bureau will continue its tradition of adapting census procedures to reflect our changing population, times, and technology.

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Section III. Legal Requirements

III. LEGAL REQUIREMENTS

The decennial census is mandated by the U.S. Constitution (Article I, Section 2) to provide the population counts needed to apportion the seats in the U.S. House of Representatives among the states. However, the Constitution does not prescribe how the decennial census should be conducted. In Title 13, U.S. Code, the Congress gave the Secretary of Commerce (and by delegation, the Director of the Census Bureau) discretion to enact decennial census plans, subject to executive and congressional review.

The planning and conduct of Census 2000 must comply with a number of legal requirements, some of which specify deadlines, as described in the following:

- The geographic scope of whom we enumerate in a decennial census is specified in Title 13 as covering the 50 states, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands of the United States, the Commonwealth of the Northern Mariana Islands, and Guam, and any other areas as may be determined by the Secretary of Commerce. In Census 2000, we also will enumerate the Pacific Island Area of American Samoa.
- The Secretary of Commerce, acting under the authority of Title 13, is required to report to the Congress twice regarding the content of the census questionnaires: first at least 3 years before Census Day (by April 1, 1997) on the subjects proposed for inclusion, and again at least 2 years before the census (by April 1, 1998) on the proposed specific question wording. Accordingly, on March 31, 1997, the Census Bureau submitted to the Secretary of Commerce for transmission to the Congress the list of

subjects proposed for inclusion in Census 2000. (See page V-4.)

- All subjects submitted to Congress had a strong legislative justification for being included. They were either specifically mandated or strongly implied by Federal law. Congress has enacted laws requiring the use of census data to determine how much Federal funding to allocate to states, cities, school districts, and other governmental units to administer a wide variety of important programs.
- On October 30, 1997, the Office of Management and Budget issued revisions to the standards for the classification of Federal data on race and ethnicity. This standard provides guidelines on how all Federal agencies are to collect, tabulate, and publish data on race and ethnicity. According to the standard, there are five categories for data on race: American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or other Pacific Islander, and White. There are two categories for data on ethnicity: Hispanic or Latino and not Hispanic or Latino. Respondents can select one or more racial designations, and all Federal agencies are encouraged to report at a minimum a count of the number of respondents reporting "more than one race."
- Public Law (P.L.) 94-311 requires the use of Spanish -language forms and Spanish-speaking interviewers in areas having significant concentrations of Hispanic populations. In Census 2000, for the first time, we will include a Spanish-language census questionnaire along with an English-language form in the mailout package for these areas.

- Before the census forms go to print, the OMB is required by law to review the questions to ensure they meet the data needs of the Executive Branch departments and agencies responsible for implementing programs mandated and authorized by the Congress. In addition, under the Paperwork Reduction Act (Title 44), the OMB must see that the time burden for a household to respond to the questionnaire is held to a minimum.
- P.L. 103-430 requires that the United States Postal Service provide its address information to the Census Bureau to improve the Master Address File (MAF).
- Established in response to the requirements of P.L. 103-430, the LUCA program (Local Update of Census Addresses) provides an opportunity for local and tribal officials to designate a liaison to review the address information in the MAF for their jurisdiction and the geographic information in the Census Bureau's geographic database (TIGER) to improve their completeness and accuracy.
- As specified in Title 13, Census Day for Census 2000 is April 1, as it has been for each decennial enumeration since 1930. All census questions generally are to be answered with reference to April 1, regardless of when the questionnaire is filled out.
- Title 13 guarantees the confidentiality of respondents' answers to the census forms. In fact, the Census Bureau takes extraordinary steps throughout the entire census process to assure the confidentiality of census information. All Census Bureau employees must take an oath of confidential-

ity. As required by Title 13, the Census Bureau maintains tight security over completed questionnaires. Furthermore, disclosure-avoidance programs during the data tabulation phase make certain that individual persons or housing units cannot be identified, either from paper or electronic tabulations.

- Title 44 specifies that individual census information from the decennial census cannot be made public for 72 years.
- Under the terms of Title 13, the Secretary of Commerce must deliver state population counts to the President within 9 months of Census Day (by December 31, 2000). These counts are used to reapportion the seats in the U.S. House of Representatives.
- P.L. 94-171 requires that the Census Bureau provide selected census tabulations to the states by April 1 of the year following the census year. The states use these tabulations to redraw the boundaries of Congressional districts as well as other areas used for state and local elections.
- Under the Voting Rights Act, the Census Bureau is required to provide to the states race and ethnic data for small geographic areas to be used for the redistricting process specified in P.L. 94-171. The race and ethnic categories required are those mandated by the standards for the classification of federal data on race and ethnicity. (see page III-1).
- P.L. 105-119 (also known as the "Department of Commerce and Related Agencies Appropriations Act, 1998"), Section 210, establishes a board known as the Census Monitoring Board. The function of

the board, as stated in the legislation, is "to observe and monitor all aspects of the preparation and implementation of the 2000 decennial census (including all dress rehearsals and other simulations of a census in preparation therefor)." The Board shall cease to exist on September 30, 2001. Section 209(j) of this same law also states that there should be sufficient funds "to plan, test, and become prepared to implement a 2000 decennial census, without using statistical methods, which shall result in the percentage of the total population actually enumerated being as close to 100 percent as possible."

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Section IV. Marketing and Partnership Program

IV. MARKETING AND PARTNERSHIP PROGRAM

OBJECTIVE

The Census 2000 Marketing and Partnership Program will be, for the first time, an integrated communications effort. The objectives of the campaign are to increase awareness of Census 2000 and boost response rates.

MAJOR FEATURES

Prior to Census Day, the Marketing and Partnership Program will be geared toward building awareness that the census is approaching and how it will benefit the community. During the mailout/mailback period, the campaign focus will shift to motivating people to return their questionnaires promptly to increase the initial mail response rate. The marketing program also will encourage cooperation with census enumerators during the followup operation with nonresponding households and will let people know the census is "not over" during the quality check survey.

The comprehensive marketing and partnership strategy includes:

- Partnerships and community outreach
- Paid advertising
- Special methods to encourage response
- Traditional public relations
- Special events

Partnerships and Community Outreach

The Census Bureau has begun forming partnerships with other Federal agencies, state, local and tribal governments, as well as with community-based organizations and businesses. The Bureau recognizes the unique local knowledge, experience, and expertise

these partners can bring to planning and taking an accurate census. Partnerships have each member performing those activities for which it is best qualified, assuring the most effective expenditure of staff and financial resources.

To establish and maintain continuing liaison and partnership with government and non-government entities, we will hire three types of Census Bureau partnership specialists throughout the country: government, media, and community specialists. The first wave of 12 government partnership specialists have been on board since 1996.

The Census 2000 Publicity Office will coordinate the full range of Census 2000 programs with governmental and nongovernmental partners to ensure that we do not make unnecessary or overlapping requests of those willing to work in partnership.

Census 2000 will provide numerous opportunities for government and nongovernment entities to participate in partnership activities. Examples of these activities include:

- The Census Bureau has formed a partnership with the U.S. Postal Service (USPS) to use its address information to enhance the Census 2000 Master Address File. Working with the USPS provides the best nationwide source of address updates, which will help reduce the number of households missed in Census 2000.
- Under the LUCA program (see page VI-5), partnerships with local and tribal governments are being formed to provide valuable assistance in reviewing and updating the Master Address File.

- Partnerships with governments and organizations will support Census 2000 promotional activities by issuing public statements of endorsement, holding press conferences, placing census articles in newsletters, including census messages in employee paychecks, sponsoring census promotional events, and posting census promotional material in agency facilities.

- Partnerships with local organizations will aid in recruiting candidates to apply for census office and field enumerator positions. Temporary jobs will be available in all geographic areas.

- Partnerships with community-based organizations and local and tribal governments will identify strategic and high visibility locations in the community to place unaddressed questionnaires, called "Be Counted" forms, for people to pick up and complete. These partners also will recommend locations for Walk-in Questionnaire Assistance Centers and for office space to test and train temporary census workers.

- During the enumeration period, partnership and outreach efforts will remind people of ways to respond if they did not receive a questionnaire. Mail response rates will be available so that outreach/partnership efforts can target slow mail response areas.

Paid Advertising

For the first time, a paid advertising campaign will be used for a decennial census. In designing the Census 2000 paid campaign, we have benefitted greatly from

the advice given by the U.S. military, the Postal Service, and private communications contractors, as well as from our own survey and focus group research. Young and Rubicam, Inc. and its partner agencies, Bravo, Mosaica, J. Curtis, Inc. and Grey and Grey Advertising, have been selected to conduct the 2000 campaign. The major components will include:

- A national media campaign, including TV (both broadcast and cable), radio, and print media, will be aimed at increasing mail response.
- Using national, regional, and local media outlets, the Young and Rubicam advertising agency will design and implement a flexible advertising effort directed at increasing mail response among targeted audences, especially traditionally undercounted populations. The local effort will use, for example, community news outlets, posters, flyers, and mass transit advertising.

Special Methods to Encourage Response

- **Integrated mailing package**. For the first time, the mailing package design—including the questionnaires, envelopes, motivational slogans, and logo—will be wholly compatible and integrated into the design of the rest of the marketing plan.
- **Direct mail campaign and mail strategy**. To increase questionnaire mail response, the Census Bureau will use a new strategy that will focus on multiple mail contacts with respondents, including mailing respondents an advance notice letter, an initial questionnaire and a thank you/reminder postcard.
- **Other ways to respond**. Also for the first time, special unaddressed questionnaires, called "Be Counted" forms, will be available at Walk-in Ques-

tionnaire Assistance Centers and other public locations for pick up and completion by people who believe that they have not been counted in the census.

Moreover, a well-publicized toll-free telephone number will assist those who request to respond to the census by this method.

Traditional Public Relations

For Census 2000, the public relations effort will be decentralized with media specialists assigned directly to local census offices to cultivate press contacts and respond to media inquiries.

Special Events

A variety of special events—such as parades, athletic events, public service television documentaries, Census in the Schools—will be co-sponsored by state, local, and tribal governments and by community organizations and businesses. The events will emphasize the importance of participating in the census and will motivate people to respond.

MILESTONES

July 1996	Began hiring 12 government partnership specialists (one per region)
July 1996	Began forming partnerships with local and tribal governments for geographic programs
April 1997	Began forming partnerships with national/umbrella governmental and nongovernmental organizations
October 1997	Awarded contract to Young and Rubicam for paid advertising campaign

October 1997	Began hiring media, community, and remaining government partnership specialists
October 1997	Began forming partnerships with local media, community organizations, and businesses
March 1998	Implement prototype advertising campaign for Census 2000 Dress Rehearsal

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Section V. Questionnaire Content, Data Collection Forms, and Sampling Plan

V.A. QUESTIONNAIRE CONTENT

OBJECTIVE

The goal in selecting Census 2000 questionnaire content is to meet the many statutory data requirements of Federal agencies, as well as the needs of state, local, and tribal governments to administer governmental programs. Given the many critical uses of census data, it is essential that the Census 2000 questionnaires contain those topics that will produce data our Nation will need as it enters the 21st Century. Nevertheless, the Census Bureau must balance the many demands for census information against the length of the questionnaires and the burden on the respondents to complete them.

MAJOR FEATURES

The content determination process is used to select the questions to be asked on the census forms. The objective of the Census 2000 content process is to develop questions that are easy to understand and answer by all segments of the population and thus yield the highest and most valid response.

The major components and general timing of Census 2000 content development activities are depicted in Figure V-1.

- Shortly after the 1990 census, the Census Bureau reviewed and evaluated the 1990 census questions through a content reinterview.
- The Census Bureau then organized an extensive review and consultation program to determine which subjects should be included in Census 2000.

- We assessed the legislative and geographic requirements of census data for both the Federal and non-Federal sectors. *Federal* agencies were asked to identify all legal mandates and programs requiring census data. *Non-Federal* requirements were obtained by means of a survey directed to a broad spectrum of data users such as state, local, and tribal governments; ethnic and community organizations; the business sector; academic researchers and librarians; religious groups; and the general public.
- We also maintained regular contact with our standing advisory committees, expert panels, professional associations, housing data-user groups, and community and ethnic organizations to ensure that all segments of the data-user community would be kept informed throughout the content development process.

Figure V-1. Content Planning Path for Census 2000

(CHART OMITTED)

- Two census tests were conducted to evaluate the questionnaire content proposed for Census 2000. The most extensive of these was the 1996 National Content Survey (formally known as the U.S. Census 2000 Test), which was designed to test new and revised question wording, formatting, and sequencing. The 1996 Race and Ethnic Targeted Test (formally known as the 1996 Census Survey) examined several major possible changes to the race and ethnic questions for Census 2000. Also, the Census Bureau in partnership with the Bureau of Labor Statistics conducted a supplement on race and ethnicity to the May 1995 Current Population Survey. During this time, the Census Bureau also conducted a wide range of focus group studies and cognitive research to elicit information about questionnaire content and design.

- On March 31, 1997, as required by law, the Census Bureau submitted a list of subjects planned for inclusion in Census 2000 to the Secretary of Commerce for transmission to Congress. As the chart below shows, both the short and long forms proposed for Census 2000 have fewer subjects than their 1990 census counterparts.

Table V-1

(Chart Omitted)

- Table V-1 provides the current plans for content for the Census 2000 questionnaire.
- The law requires that the actual questions for Census 2000 be submitted to the Congress by April 1, 1998. Thus, we have determined the particular wording, format, and sequence of individual questions. To make these critical decisions, the Census Bureau was guided by:
  - Any budget and content constraints imposed by the Congress
  - The results of our Census 2000 research and testing program
  - The advice generated from our ongoing consultation process with stakeholders
  - The legislative requirements for data from the questions

TABLE V-1. SUBJECTS PLANNED FOR INCLUSION IN CENSUS 2000

100-PERCENT SUBJECTS

POPULATION	HOUSING
Name	Tenure (whether home is owned or rented)
Sex	
Age	
Relationship	
Hispanic origin	
Race	

SAMPLE SUBJECTS

POPULATION

Social characteristics:
Marital status
Place of birth, citizenship, and year of entry
Education-school enrollment and educational attainment
Ancestry
Residence 5 years ago (migration)
Language spoken at home
Veteran status
Disability
Grandparents as caregivers *

Economic characteristics:
Labor force status (current)
Place of work and journey to work
Work status last year
Industry, occupation, and class of worker
Income (previous year)

HOUSING

Physical characteristics:
Units in structure
Number of rooms
Number of bedrooms
Plumbing and kitchen facilities
Year structure built
Year moved into unit
House heating fuel
Telephone
Vehicles available
Farm residence

Financial characteristics:
Value of home
Monthly rent (including congregate housing)
Shelter costs (selected monthly owner costs)

*New subject for Census 2000.

1990 CENSUS SUBJECTS DROPPED FOR CENSUS 2000

POPULATION

Children ever born (fertility)
Year last worked *(An abbreviated screener will be included with questions about industry, occupation, and class of worker; this will allow us to reduce respondent burden and properly define the "experienced civilian labor force")*

HOUSING

Source of water
Sewage disposal
Condominium status

- The questions we plan to ask in the Census 2000 Dress Rehearsal will be, to the greatest extent possible, the same as those we subsequently include in Census 2000. In this way, we can develop prototypes of the products planned for Census 2000, solicit comments from our stakeholders, and fine-tune the products for the census.
- The Census Bureau also is required by law to submit the recommended questions to the Office of Management and Budget (OMB), which has the responsibility of ensuring that the questions meet essential data needs and that respondent burden (the time it takes for the average household to fill out a questionnaire) is held to a minimum.

MILESTONES

March 31, 1997	Submitted subjects planned for Census 2000 to the Congress
April 1, 1998	Submit questions planned for Census 2000 to the Congress
July 1998	Submit questions planned for Census 2000 to OMB

V.B. MAILBACK QUESTIONNAIRE FORMS

OBJECTIVE

The goals in developing the Census 2000 questionnaires are to increase mail response and the accuracy of the information collected. The Census Bureau intends to do this by:

- Designing forms that are more respondent-friendly, and
- Increasing the number of mail contacts with respondents.

MAJOR FEATURES

In Census 2000, the questionnaire mailout/mailback system again will be the primary means of census-taking. Cities, towns, and suburban areas with city style addresses (house number and street name), and rural areas where city style addresses are used for mail delivery will comprise the mailout/mailback areas. In areas where the addresses are predominantly non-city style, census enumerators will deliver addressed questionnaires for respondents to mail back.

Respondent-Friendly Design

The Census Bureau has been working with private sector designers to produce more streamlined forms that are easy to read and understand, show people why they are asked the questions, and are simple to fill out and mail back. One key innovation is that the design of the complete mailing package—including the outgoing and return envelopes, cover letter, questionnaire, motivational slogans, and logo—will be compatible and integrated with the rest of the marketing and communications effort.

The following user-friendly design features have been shown in our testing and research program to improve response and are being incorporated into the design of the Dress Rehearsal and Census 2000 forms:

- A larger, easier-to-read font
- Graphic icons distributed throughout the forms to illustrate the benefits of the census to the individual and community
- Strong visual contrast—using color and shading —between the questions and answer boxes to make it easier to identify the correct space to answer
- All questions for each household member grouped together in one space instead of in the row-column answer format with the questions placed vertically down the left-hand side of the page and the names of household members place horizontally across the top
- Navigational aids such as arrows to guide the respondent through the questionnaire
- Putting the respondent instructions directly on the form instead of in a separate guide

In redesigning the forms, the Census Bureau also is incorporating the specifications required for printing, postal delivery, and electronic image data capture.

Types of Mailback Questionnaires

Census 2000 will include two types of questionnaires for mailout:

- A "short" form will be delivered to approximately 83 percent of all housing units. It will include the basic population and housing questions pertaining to each household member (up to 5 people) and housing unit.

This form will allow the respondent to list up to 12 household members.

- A "long" form will be delivered to a sample —approximately 17 percent—of all housing units. It will include the short-form questions as well as additional questions on the characteristics of each household member (up to 5 people) and the housing unit. Obtaining these detailed, more comprehensive data on a sample basis is less costly than obtaining the same information from all housing units. This form will allow the respondent to list up to 12 household members.

Delivery of Questionnaires in Other Languages

Questionnaires in English will be delivered to every housing unit. For the first time in a decennial census, specific neighborhoods will be targeted for delivery of questionnaires in Spanish or other languages, both short and long form. While the Census Bureau has made Spanish-language questionnaires available in the past, non-English questionnaires have never before been included in the initial mailout package.

Multiple Mailing Strategy

The Census Bureau is investigating policy and operational issues of conducting a new mailing strategy for Census 2000. This strategy—which has been demonstrated in our testing and research to boost response —increases the number of mail contacts we have with respondents. The multiple mail contacts consist of:

- An advance notice letter to every mailout address that alerts households the census form is being sent to them soon
- A questionnaire to every mailout address

- A postcard to every mailout address that serves as a thank you for respondents who have mailed back their questionnaire or as a reminder to those who have not

A full-scale multiple mailing strategy, using first-class postage for all mailing pieces, will yield maximum mail response and increase the likelihood of delivery to the correct address. In areas where census enumerators will deliver questionnaires, the U.S. Postal Service will deliver an advance notice letter and thank you/ reminder postcard to every "Residential Customer" so these people will be alerted to the census.

MILESTONES

November 1998	Government Printing Office begins awarding contracts for printing short form and long form
February 2000	Complete questionnaire printing and addressing for mailing
March 2000	USPS delivers questionnaire to every mailout address
March 2000	Census enumerators deliver questionnaires in areas lacking city style addresses

V.C. FIELD DATA COLLECTION FORMS

OBJECTIVE

While the mailout questionnaires will account for the bulk of Census 2000 data collection, the Census Bureau is developing many other forms to ensure that everyone has the opportunity to participate in Census 2000. These special forms will be used to enumerate people who live in a residence other than the usual house, apartment, or mobile home, or to increase the participation of people who might otherwise go uncounted in the census.

MAJOR FEATURES

- Several types of questionnaires—containing only population questions for one person—will be used to enumerate specific segments of the population. These forms will be used to count people in living arrangements requiring special operations, such as college dormitories, nursing homes, shelters, and prisons. Long-form versions are being developed for some of the forms; many will be translated into Spanish.

- Short- and long-form "simplified enumerator questionnaires" are being developed that are worded to conform to a personal interview method of data collection. These forms will be used as basic data collection instruments by field enumerators during personal visits to households.

- A short form is being prepared for the Be Counted National campaign (see page IX-3) for people who did not receive a questionnaire or believe they were

not included on a census form. These unaddressed Be Counted questionnaires will be printed in several languages and placed at locations where people frequent, such as in community centers and Walk-in Questionnaire Assistance Centers. The responses on these forms will be checked against census records to eliminate duplications.

MILESTONES

July 1999 Begin questionnaire printing

V.D. SAMPLING PLAN FOR THE LONG-FORM QUESTIONNAIRE

OBJECTIVE

Since the 1960 census, the bulk of decennial census data has been collected from a sample of housing units. Likewise in Census 2000, the Census Bureau will deliver the long-form questionnaire to a sample of housing units. The use of sampling will allow the Census Bureau to meet the objectives of reducing cost and maintaining the level of respondent burden comparable to the 1990 census.

MAJOR FEATURES

Decennial census data collected on a variety of socio-economic and housing subjects are required by Federal agencies for implementing programs defined in legislation. In addition, these data are used by state, local, and tribal governments, as well as the private sector for planning and developing social and economic policy and for a myriad of other uses.

To collect these valuable data, Census 2000 will implement a **variable rate sampling scheme**. Use of **variable** sampling rates will allow for more efficient allocation of the sample and will maintain the accuracy and reliability of census data at small geographic levels (block groups, census tracts, and small communities), while reducing respondent burden.

The variable rate sampling scheme for the Census 2000 long form will be similar to the 1990 census scheme and basically will be as follows:

- The overall sampling rate will be about 1-in-6 households or 17 percent.

- We will assign sampling rates of 1-in-2, 1-in-4, 1-in-6, or 1-in-8 to functioning governmental units and census tracts based on precensus counts of housing units. School districts will be considered governmental units, and the precensus counts of housing units for American Indian and Alaska Native areas will reflect the American Indian and Alaska Native populations.

MILESTONES

September 1998	Determine final long-form sampling methodology
September 1999	Determine long-form sample to implement variable-rate sampling methodology

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Section VI. Address List Development and Review/Update

VI.A. ADDRESS LIST DEVELOPMENT

OBJECTIVE

The Census Bureau will construct a complete listing of living quarters to use for questionnaire delivery and to control the collection and tabulation of Census 2000 data.

MAJOR FEATURES

To enumerate and tabulate Census 2000, the Census Bureau must identify all living quarters and locate these living quarters with respect to the geographic entities for which we report data. We accomplish this by creating and maintaining a Master Address File (MAF) that identifies all living quarters and spatially locates those addresses using our geographic database called TIGER®*. The building and maintenance of the MAF and TIGER involve partnerships with other Federal agencies, state, local, and tribal governments, regional and metropolitan planning agencies, the private sector, and nongovernmental organizations.

In order for Census 2000 to be as accurate, complete and cost effective as possible, the address list that serves as the basic control for the census must be as accurate and complete as possible. If an address is not on the list, then its residents are less likely to be included in the census. Recognizing this fundamental connection and based on evidence gained from the experiences of the past two years, in September 1997, the Census Bureau completed an intensive Census 2000

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* TIGER® is a registered trademark of the U.S. Bureau of the Census. For ease of presentation, the trademark symbols for TIGER and TIGER-related products are omitted from the text.

Address List Reengineering effort. The reengineering led to changes in the initial plan that will increase the accuracy and completeness of the Census 2000 address list.

The inventory of all living quarters includes addresses and/or location descriptions for each housing unit and each group quarters. Except where the address list is created at the time of enumeration (for list/enumerate areas), each listing must have a complete address that can be used for mailing a census questionnaire and/or a location description that can be used by an enumerator to locate the living quarters. Each listing must be linked to the TIGER data base.

We are creating and maintaining the MAF through a series of operations, described in the following:

In areas where most mailing addresses are city style (for example, 101 Main Street) we:

- Create the MAF by combining addresses from the 1990 census Address Control File with those addresses in the USPS Delivery Sequence File (DSF). The 1990 census Address Control File is a nationwide file of addresses for all living quarters included in the 1990 census. The DSF is a national file of individual mail delivery point addresses. As part of a cooperative agreement, the USPS provides the Census Bureau with updated DSFs on a regular basis.

- Locate these addresses in the TIGER data base. Where we cannot locate an address, the location is researched and resolved through an office or field operation, or through assistance from local partners. As a result of this research, we identify new

features and correct and add address ranges to the TIGER data base. (See page VII-1.)

Since we will use mailout/mailback enumeration methodology in areas with a predominance of mail delivery to city style addresses, we need to determine where mail is not delivered to city style addresses. In addition, there are some areas that are very remote or sparsely populated to which we want to send an enumerator only once. We identify these areas for different enumeration methodologies using information on the types of mail delivery, the types of addresses, and our regional office knowledge of the area. We create the address list in these areas during:

- Address listing operations. In areas where the addresses are predominately non-city style, the Census Bureau will create an address list through a door-to-door canvassing operation and identification of the location of each structure on census maps. The completed address listings and their map locations will be recorded in digital format and added to the MAF and TIGER data base, respectively. We will enumerate these areas by having enumerators leave addressed census questionnaires, which residents will complete and mail-back, during an update/leave operation (enumerators also update the address list and census maps during this operation). Where there is no mailing address for the listing or the mailing address is not a city style address, the listing will include a location description.
- List/enumerate operations. Census enumerators will create the address list at the time of enumeration while canvassing their assignment area and picking up or completing unaddressed questionnaires that the USPS previously delivered to each household. The completed address listings and their locations on a census map will be recorded in digital format and added to the MAF and TIGER data base.

- Map update operations. Before the address listing and list/enumerate operations, the Census Bureau will work with local and tribal government partners to update the streets and roads in the TIGER database. Updating the TIGER database with new development in these areas will make the address listing more efficient and help ensure that no living quarters are missed.

We will incorporate local knowledge to update the MAF through the Local Update of Census Addresses (LUCA) program. (See page VI-5.)

A separate operation will build an inventory of all special places. We will interview an official at each special place using a Facility Questionnaire. The responses to the questionnaire will identify each group quarters and any housing units associated with the special place. We will classify each group quarters and any housing units according to whether they will be enumerated as part of special place enumeration or through regular enumeration. We will add those group quarters and housing units to the MAF and link them to the TIGER data base, respectively.

In city style address areas, we introduced two operations as a result of the reengineering effort to improve the quality of the MAF. The Census Bureau will conduct a 100 percent block canvass to ensure consistently good address coverage in the MAF and to ensure correct geographic locations for all addresses. As close to Census Day as possible, we also will ask USPS letter

carriers to validate the addresses in the MAF, identifying and adding addresses that are missing.

As another quality check, we will be comparing the number of addresses in the MAF with independent housing benchmarks for aggregated areas and releasing results for Census Divisions and at the national level.

MILESTONES

September 1997	Determined areas for different enumeration methodology
January-April 1998	Conduct the Map Update program for areas without city style addresses
April-November 1998	Conduct the LUCA program for city style address areas
July-December 1998	Conduct address listing operations (except list/enumerate)
January-May 1999	Conduct 100 percent block canvassing
January-April 1999	Conduct the LUCA program for address listing areas
July 1999	Deliver first nationwide MAF for Census 2000
January 2000	Conduct the Postal Check
February 2000	Complete MAF/TIGER integration for areas with mail delivery to city style addresses

VI.B. ADDRESS LISTING

OBJECTIVE

To develop the Census 2000 address list in areas of predominantly non-city style addresses.

MAJOR FEATURES

- Census enumerators will canvass their assignment areas and list each living quarters, recording its mailing address and a description of its physical location. The enumerators will identify the approximate location of each structure containing living quarters by placing a spot on a census map, and they will update the information on their maps.
- The Census Bureau will convert the addresses and map updates into computer readable form. As address listing is completed, the Census Bureau will data capture the address information in a keying operation. Address listing maps will be scanned to produce computer readable images of the map spots. In the final data capture step, the map spots and updated map information will be entered into the TIGER®* data base.
- The Master Address File will be created for the listed areas from the address information identified and captured during the address listing operation.

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MILESTONES

January-May 1998	Conduct Map Update operation
February-June 1998	Update TIGER data base
August-December 1998	Conduct address listing operation
September 1998-February 1999	Add addresses to the MAF and map corrections to TIGER
January-April 1999	Conduct the LUCA program for address listing areas

VI.C. LOCAL UPDATE OF CENSUS ADDRESSES PROGRAM

OBJECTIVE

To create partnerships with local and tribal governments to improve their jurisdictions' address list for Census 2000.

MAJOR FEATURES

The Local Update of Census Addresses (LUCA) program is a partnership program that will allow the Census Bureau to benefit from local knowledge in developing its MAF. The participants will contribute to a more complete and accurate census for their area.

LUCA is made possible by the Census Address List Improvement Act of 1994 (P.L. 103-430) which, for the first time, authorizes designated representatives of local and tribal governments to review the MAF. The program will operate as follows:

- The local or tribal government will designate a liaison to review the portion of the MAF for their jurisdiction. The liaison will be subject to the same restrictions on revealing census information as are census workers. The address list is confidential under Title 13, and participants must sign an oath promising to protect the confidentially of the addresses.
- The Census Bureau will send the liaison a listing from the MAF (in either paper or electronic form), the accompanying maps for their jurisdiction, and a tally of MAF records for each census block.
- The liaison will provide input regarding the completeness and accuracy of the MAF.

- Census Bureau staff will validate the address information provided by local and tribal participants and provide feedback about address actions it has taken to the participants.
- Following the feedback, Census Bureau staff will work with the local and tribal government participants to resolve any remaining differences.
- P.L. 103-430 allows the local participants to appeal final Census Bureau decisions.
- The Census Bureau will conduct the LUCA Program during two distinct time periods that correspond to the time schedule for developing the MAF. For areas with predominantly city style mailing addresses, participants may begin reviewing the address list in April 1998, because the MAF has been created using addresses obtained from the USPS. For other areas, the address list will not be available for review until 1999, after the Census Bureau completes the Address Listing Operation to create the MAF in these areas. These areas can get an early start by reviewing and updating maps for their communities in early 1998; this activity will benefit the Census Bureau's later address listing work by yielding more up-to-date street information for reference by the address listing field staff.
- The details of the LUCA program in remote or sparsely settled areas, where we compile address lists during enumeration, are under development.

MILESTONES

City Style Mailing Address Areas

January-February 1998	Mail invitation letters for address list review to local and tribal governments
April-November 1998	Local and tribal governments conduct review
August 1998-February 1999	Provide summary feedback to participants
March-August 1999	Provide specific address feedback to participants and reconcile differences
May 1999-January 2000	LUCA appeals

Non-City Style Mailing Address Areas

January 1998	Mail invitation letters for map review to local and tribal governments
January-May 1998	Local and tribal governments conduct map review
September 1998	Mail invitation letters for address list review to local and tribal governments
January-April 1999	Local and tribal governments conduct address list review
March-August 1999	Provide feedback to participants and reconcile differences
May 1999-January 2000	LUCA appeals

VI.D. BLOCK CANVASSING

OBJECTIVE

To ensure the completeness and accuracy of the Census 2000 address list for areas having predominantly city style addresses used for mail delivery.

MAJOR FEATURES

- Census enumerators will canvass every road and street looking for every place where people live or could live, comparing the address of each living quarters with the addresses in the Census 2000 address list. They will add addresses missing from the address list, delete addresses on the address list that duplicate other addresses or do not exist on the ground, and ensure all addresses are assigned to the correct geographic location. The enumerators also will update census maps with information about the location and names of roads and streets.
- The Census Bureau will convert the new and corrected address and map information into computer readable form. As block canvassing is completed, the Census Bureau will data capture the address updates in a keying operation and the updated map information will be entered into the TIGER®* data base.
- The MAF will be updated with the results of the block canvassing in time to use the updated address information for delivery of questionnaires.

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MILESTONES

January-May 1999	Conduct block canvassing
April-June 1999	Update the MAF and TIGER

VI.E. POSTAL CHECK

OBJECTIVE

To validate the city style addresses before the delivery of Census 2000 questionnaires through a check of the MAF by USPS letter carriers. This postal validation will help ensure that new construction and previously missed units are included in time for the Census 2000 questionnaire mailout.

MAJOR FEATURES

- Following the LUCA and block canvassing operations, and as close to Census Day as possible, the Census Bureau will give the USPS the census addresses printed on cards.
- USPS letter carriers will compare the census addresses to the postal delivery addresses on their routes, adding addresses for which they do not have a census address card.
- The Census Bureau will key the addresses added by the USPS and add new addresses to the MAF.

MILESTONES

November 1999	Provide census addresses to USPS
December 1999-January 2000	USPS compares census addresses to delivery addresses
February 2000	Add new address to the MAF

United States
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2000

Section VII.
Geographic Data
Base Development-TIGER

VII. GEOGRAPHIC DATA BASE DEVELOPMENT
TIGER®*

OBJECTIVE

To provide the necessary information to associate each living quarters in Census 2000 to a spatial location, each location to a specific geographic area, and each geographic area to the correct name or number and attributes.

MAJOR FEATURES

The geographic data base for the census—TIGER (Topologically Integrated Geographic Encoding and Referencing)— provides the geographic structure for the control of the data collection, tabulation, and dissemination operations.

The geographic data base constantly changes. Not only are new streets built, but some streets cease to exist, and the path of some existing streets moves. The names and address ranges associated with these streets change, too. Not only is the inventory of geographic entities different from year to year, but also the boundaries, names, and related attributes for the entities may change.

To ensure that the information in the TIGER data base is complete and correct, the Census Bureau works in partnership with other Federal agencies, state, local,

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and tribal governments, and others in the public and private sectors. We maintain the TIGER data base through internal programs and partnership activities.

The Census Bureau obtains updates to the feature network, including associated address ranges, through the following operations:

- Census MAF building activities. These include office resolution of addresses that cannot be automatically spatially located and the various address list improvement operations.
- Partnership MAF building activities. These include the LUCA program, and local participation in the resolution of addresses that need to be spatially located.
- Digital files. Local and tribal governments with suitable digital files provide them to the Census Bureau in lieu of a manual updating process. We transfer the update information from the local file to the TIGER data base by an automated process.
- Local and tribal governments. In response to a preview of the census map of their jurisdiction, local and tribal governments may furnish the Census Bureau with updated street features and their names.

We obtain updates to the boundaries, names, and attributes of the various geographic entities for which we tabulate data through various methods. These include:

- A voluntary survey designed to collect an accurate inventory of all active general-purpose governmental units and to obtain up-to-date information on boundary changes.

- A program that provides the highest elected official of each active general-purpose governmental unit with a copy of the census map that shows the jurisdiction boundaries we plan to use to tabulate Census 2000. The local or tribal official will review and validate these boundaries. This program replaces the local review of boundaries portion of the 1990 Postcensus Local Review Program.
- A program that provides local and tribal participants the opportunity to delineate Census 2000 participant statistical areas (block groups, census county divisions, census designated places, and census tracts).
- Additional programs that offer participants the opportunity to identify other areas for which the Census Bureau will tabulate data (for example, traffic analysis zones).

The Census 2000 boundaries for general-purpose governments and other legal entities are those legally in effect on January 1, 2000. Where the boundaries for any geographic entity intersect a feature, we assign any addresses associated with that feature to the geographic entity. The LUCA and boundary collection and validation programs also provide participants with the opportunity to review the assignment of addresses in their jurisdiction.

The information from all these programs and operations is inserted into the TIGER data base where it is processed and undergoes various checks for consistency and accuracy. As required by specific census operations, the Census Bureau creates extracts from the TIGER data base to produce the necessary map products and geographic files.

MILESTONES

January 1998	Begin survey to collect January 1, 1998 boundaries
November 1998	Begin survey to collect January 1, 1999 boundaries
October 1999	Begin survey to collect January 1, 2000 boundaries
January 2000	Begin conducting final boundary validation
October 2000	Establish tabulation geographic structure

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2000

Section VIII. Field Office Infrastructure and Staffing

VIII.A. FIELD OFFICE INFRASTRUCTURE AND STAFFING

OBJECTIVE

To develop and set up an effective and cost-efficient infrastructure that supports complete and accurate enumeration in Census 2000 and the capture and processing of census information in time to meet Constitutional and legislative requirements.

MAJOR FEATURES

Since the decennial census requires a massive mobilization of human and physical resources, the Census Bureau will develop an extensive temporary office infrastructure across the country to conduct Census 2000.

Physical Infrastructure

The function of each major infrastructure component is as follows:

Regional Census Centers (RCCs) - 12 stateside Centers (and an Area Office in Puerto Rico)

- Manage all census field data collection operations, address listing, and address list enhancement for city style address areas through a network of Census Field Offices (CFOs) and Local Census Offices (LCOs)
- Coordinate Local Update of Census Addresses (LUCA) activities
- Produce maps

- Conduct geographic activities such as geocoding, TIGER®* data base updates, and working with local participants on the participant statistical programs and the P.L. 94-171 Redistricting Data Program
- Recruiting temporary staff
- Manage payroll and personnel administrative system

Census Field Offices (CFOs) - (402 Offices)

- Perform address listing
- Conduct local recruiting
- Perform clerical review of completed field work

Local Census Offices (LCOs) - maximum 520 Offices (511 stateside, 9 in Puerto Rico)

- Produce enumerator maps and assignments
- Conduct local recruiting
- Conduct outreach and promotion (for example, the Be Counted campaign)
- Conduct group quarters/special place/service-based enumeration operations
- Coordinate military enumeration (if applicable)
- Conduct update/leave operation
- Conduct list/enumerate operation
- Conduct followup enumeration (nonresponse follow-up, coverage edit, address verification)
- Manage field staff payroll and personnel administrative system
- Perform block canvass operation (early opening LCOs)

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Data Capture Center (DCC) in Jeffersonville, Indiana

- Process address listing
- Check in mail returns
- Edit questionnaires
- Conduct data capture
- Code questionnaires
- Process quality check survey
- Manage payroll and personnel administrative system

Other Data Capture Centers (DCCs) - 3 Centers

- Check in mail returns
- Edit questionnaires
- Conduct data capture
- Manage payroll and personnel administrative system

Establishing the above offices will involve the following activities:

- Lease office space
- Obtain furniture, equipment, and supplies
- Procure and install computer hardware and software (except for CFOs)
- Establish voice and data line connections

Administrative Infrastructure

In addition to physical infrastructure, there are administrative structure requirements that must be in place to recruit, manage, and pay the census workers who are hired.

These functions consist of the following:

- Develop system of competitive pay rates
- Develop position descriptions
- Validate selection aid test

- Implement Decennial Automated Name Check (DANC) system for criminal history screening of potential census workers
- Implement Preappointment Management System/ Automated Decennial Administrative Management System (PAMS/ADAMS) to handle hiring of temporary census workers and to manage the payroll system
- Develop bonus/incentive pay system that supports producing a quality product, staff retention, and high productivity

MILESTONES

November 1997-March 1998	Open RCCs
June 1998-September 1998	Open CFOs
September 1998-October 1999	Open LCOs (Early opening LCOs September 1998; Late opening LCOs October 1999)
April 1999-September 1999	Open DCCs

VIII.B. FIELD OFFICE STAFFING

OBJECTIVE

To recruit and train a sufficient number of temporary census workers to complete Census 2000 operations on schedule.

MAJOR FEATURES

The decennial census is the largest peacetime activity undertaken by the Federal Government. The Census Bureau expects to hire about 500,000 temporary census workers in the field to conduct Census 2000. Attaining this goal will require the recruiting and testing of nearly 3 million of persons for a wide range of positions such as local census office managers, enumerators, partnership specialists, media specialists, and clerks. This effort will require a very large recruiting effort throughout the country.

Every job applicant will have to take a written test and meet certain other requirements before being hired as a census worker. The Census Bureau will use the Decennial Applicant Name Check (DANC) system to screen all applicants for criminal histories. Qualified applicants who are selected will be required to take the oath of office and sign an affidavit of nondisclosure in which they agree they will "not disclose any information contained in the schedules [questionnaires], lists, or statements obtained for or prepared by the Bureau of the Census, to any person or persons either during or after employment."

In recognition of the changing composition of the labor force and the increasing difficulty in hiring a sufficiently large number of temporary census workers, especially

enumerators, to conduct the census, the Census Bureau is implementing different and innovative methods of setting pay and incentives for persons to work on Census 2000. In addition, the Census Bureau is attempting to expand the labor pool from which it can recruit by negotiating with other Federal and state agencies that manage retirement and income transfer programs (Federal civilian and military retirement, Aid to Families with Dependent Children, Public and Indian Housing program, and so on) to reduce any barriers and encourage recipients of the various programs to work for the Census Bureau.

MILESTONES

January 1997	Began DANC system
June 1998	Begin recruiting for census field offices

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Section IX. Field Data Collection

IX.A. BASIC ENUMERATION STRATEGY

OBJECTIVE

To obtain a completed questionnaire for every housing unit in Census 2000.

MAJOR FEATURES

To ensure that we obtain a completed questionnaire from every housing unit, the Census Bureau must first make sure that a questionnaire is delivered to every housing unit. We will accomplish this by using one of the following three basic data collection methods:

- **Mailout/mailback.** The Census Bureau will use U.S. Postal Service (USPS) letter carriers to deliver questionnaires to the vast majority of housing units that have city style addresses (house number and street name).
- **Update/leave.** In areas where the addresses used for mail delivery are predominantly noncity-style, enumerators will leave addressed census questionnaires at each housing unit for the householder to complete and mail back. They also will update and make any necessary corrections and/or additions to their maps and their address lists as they deliver the questionnaires.
- **List/enumerate.** In very remote or sparsely-populated areas, enumerators will visit each housing unit and pick up or complete unaddressed short-form questionnaires that the USPS previously delivered to each unit. The enumerators will ask additional long-form questions of a sample of units. They also will develop an address list for the area and spot the housing unit's location on a map.

Additional data collection strategies noted in the following sections cover enumeration of special population groups (for example, persons in group quarters and on military bases), people with no usual residence, and nonresponse followup of housing units that did not return a questionnaire.

MILESTONES

March 13-March 15, 2000	Deliver initial mailout/ mailback questionnaires
March 3-March 30, 2000	Conduct update/leave operation
March 31-May, 1 2000	Conduct list/enumerate operation

IX.B. TELEPHONE ASSISTANCE AND THE INTERNET

OBJECTIVE

To provide respondents with convenient access to obtain assistance in the completion of their Census 2000 questionnaires or to respond directly to the census.

MAJOR FEATURES

- The Census Bureau will contract for an extensive Telephone Questionnaire Assistance (TQA) operation to answer general questions about the census so that the respondent can complete the census questionnaire and mail it back. This service will have a well-publicized national toll-free number and will use an automated touch-tone system that can handle a large number of calls concurrently. Assistance will be available in English, Spanish, and other languages. There also will be a toll-free telephone device for the hearing impaired. Finally, respondents will be able to access a census Internet website for assistance in completing the census questionnaire.
- In addition, TQA will offer a means for callers to respond directly to the census. Operators will record answers to the census over the telephone, if this service is requested during telephone assistance. Assistance will be available in English, Spanish, and other languages.

MILESTONES

October 1998	To be determined
March-June 2000	Conduct TQA

IX.C. BE COUNTED NATIONAL CAMPAIGN

OBJECTIVE

The Be Counted National Campaign will provide a means for people to be included in Census 2000 who may not have received a census questionnaire or believe they were not included on one. The Census Bureau will place particular emphasis on developing ways to include population groups that historically have been undercounted.

MAJOR FEATURES

Be Counted Questionnaire

The Be Counted questionnaire is being designed to be respondent friendly and easy to understand and complete by anyone who picks it up. This would include people with a usual residence who did not receive a questionnaire at their address, people who believe the returned questionnaire for their address excluded them, people who require questionnaires in different languages, migrants or seasonal farm workers, those who have no usual residence, and so forth. These forms will contain short-form questions along with several additional items needed to process and match the forms to the census results.

Questionnaires Available in Many Locations and In Numerous Languages

Be Counted questionnaires will be accessible at public locations, such as Walk-in Questionnaire Assistance Centers and other places where people frequent.

The distribution of the Be Counted forms will begin just before Census Day and will end just before the nonresponse followup operation begins.

Be Counted forms will be printed in several languages in addition to English and Spanish. We will consult with our local partners to determine which languages to use for these forms.

MILESTONES

September 1998	Submit printing specifications of Be Counted questionnaires for bid
August 1999	Begin printing Be Counted questionnaires
March 31-April 12, 2000	Conduct Be Counted Campaign

IX.D. PROCEDURES TO ENUMERATE SPECIAL POPULATIONS

OBJECTIVE

In Census 2000, the Census Bureau will implement a comprehensive set of procedures to enumerate people who do not live in traditional housing units. These include people who live in group quarters situations (for example, nursing homes, group homes, and colleges), people without housing, people who live at migrant and seasonal farmworker camps, and people living on military installations and ships. Special procedures also will be applied to those who live in unique areas of the country like remote Alaska.

MAJOR FEATURES

Special Place Facility Questionnaire Operation

To enumerate people at these special locations, we must identify the places. Identification of these places will occur on a flow basis, by means of a procedure called the Special Place Facility Questionnaire Operation. This operation will update existing information for our inventory of special places and group quarters, identify additional group quarters, identify contact persons at each location, assign a group quarters type code, determine availability of administrative records, identify any housing units at and/or associated with the special place or group quarters, and collect other administrative information. Most information will be collected during an automated Computer-Assisted Telephone Interview (CATI), with some cases being completed by personal visit using a paper census questionnaire.

Group Quarters Enumeration

Staff in our local census offices will conduct the group quarters enumeration. Starting in January 2000, census workers will make advance visits to the group quarters to meet with facility staff and discuss the upcoming census enumeration. These visits are very beneficial because they promote and encourage participation in the census, and identify any difficulties that might be encountered during the enumeration. In April 2000, enumerators will enumerate people in each group quarters by listing all the residents and distributing questionnaire packets. When needed, enumerators will provide assistance in completing the questionnaires. Enumeration results will be checked and verified using a quality control checklist to ensure enumeration at the facility was complete.

A small number of facilities, such as jails and prisons, will self-enumerate their facility. These facilities will use regular census procedures to conduct the enumeration, and the facility staff become special sworn census employees to protect the confidentiality of the census information.

Transient Night (T-Night) Operation

Transient night, commonly referred to as T-Night, is an operation designed to count persons of a highly transient nature. T-Night will take place on the day before Census Day (on Friday, March 31). T-Night enumerators will visit and interview people occupying campgrounds at racetracks, recreational vehicle (RV) campgrounds or RV parks, commercial or public campgrounds, fairs and carnivals, and marinas. Every person enumerated during T-Night will have the opportunity to report a usual residence.

On T-Night, enumerators will visit each assigned T-Night place, meet with a contact person at the site to explain the purpose of the visit, offer the Privacy Act notice, answer any questions, and verify information about the site. Then the enumerator will interview each person at the assigned location.

Remote Alaska Enumeration

Several methods will be used to enumerate the varied types of areas in the State of Alaska. The two largest cities, Anchorage and Fairbanks (and their vicinities), will be designated as mailout/mailback areas due to their concentrated populations and existence of city style addresses. The rest of Alaska will be enumerated by the list/enumerate method, which also is being used in the sparsely populated areas of the lower 48 states.

The unusual feature of Census 2000 enumeration in Alaska will be the treatment of outlying or remote areas. Most of these settlements, located throughout the state, are accessible only by small-engine airplane, snowmobile, four-wheel-drive vehicle, dogsled, or a combination of these. Roads rarely exist to link the widely scattered settlements. These settlements range in population from a few people to several hundred persons, with a few larger places of 2,000 people or more.

The timing of the mailout/mailback enumeration will be the same as in other states. However, enumeration of the remote areas will begin earlier, in mid-February, but all census questions will be asked in relation to Census Day (April 1). The special timing will permit travel to these areas during the period when conditions will be most favorable. For example, the ground and rivers still will be frozen so that planes can fly in and

out, and the residents will still be at home. Once the spring thaw (or "breakup" as it is known locally) begins, travel to some of these areas will be difficult or impossible, and the people will leave home to fish and hunt. Enumerators will have to finish their work before then, or they will miss a large part of the population.

Military/Maritime Enumeration

People living on military installations and on maritime vessels will be enumerated during Census 2000. To enumerate people residing on military installations and on military ships, the Census Bureau will work with the Department of Defense and U.S. Coast Guard to identify housing units and other living quarters on the installations, and ships in U.S. waters. Different enumeration methodologies, such as mailing census questionnaires to housing units on installations and enumerating people at their work station, will be used.

The Census Bureau will work with the U.S. Maritime Administration and others to identify maritime vessels in operation at the time of the census and mail enumeration materials to those vessels for completion.

MILESTONES

June 1998-March 2000	Conduct Special Place Facility Questionnaire Operation
January 2000	Conduct advance visits to special places/group quarters
January 2000	Conduct local knowledge update of group quarters locations
February 2000	Begin enumeration in remote Alaska
March 31, 2000	Conduct T-night operation
April 3-May 6, 2000	Enumerate people at group quarters and conduct coverage improvement validation

IX.E. ENUMERATION OF PEOPLE WITH NO USUAL RESIDENCE

OBJECTIVES

To enumerate people with no usual residence in Census 2000. This operation, called Service-Based Enumeration (SBE), is designed to improve the count of an area by including people who use services and who might not be included through other enumeration methods.

MAJOR FEATURES

The following SBE procedures are designed to include people who might otherwise be missed in the census by enumerating them at selected service locations, such as shelters and soup kitchens, and at targeted non-sheltered outdoor locations. SBE will not provide a count of homeless persons or of service users.

- The Census Bureau will work with local governments and community-based organizations to identify the list of service locations open at census time.
- Using simplified enumeration procedures and forms, the Census Bureau will conduct a one-time enumeration at shelters, soup kitchens, and regularly scheduled mobile food vans that provide services primarily for people without housing.
- The Census Bureau will use statistical techniques to improve the enumeration of people without housing.
- The Census Bureau plans to have enumerators visit targeted non-sheltered outdoor locations where people without housing congregate. These sites will be identified by local officials, advocacy groups, and community-based organizations.

- The Census Bureau will work with local officials and community-based organizations to identify camps and other locations where migrant and seasonal farmworkers can be found at the time of the census.

In addition to being enumerated at the designated service locations, people with no usual residence will be able to pick up Be Counted questionnaires at other selected service locations, such as clothing distribution centers, drop-in centers, and health care clinics serving people without housing.

We also will publicize a national toll-free telephone number and encourage people to respond that way if they do not have access to a census questionnaire.

MILESTONES

March-July 1999	Develop list of service locations
April 3 and April 5, 2000	Conduct enumeration of people at service locations
April 2000	Distribute Be Counted questionnaires at service locations

IX.F. SPECIAL DATA COLLECTION METHODS FOR TARGETED AREAS

OBJECTIVE

To overcome barriers to successful enumeration in Census 2000 by implementing special data collection methods in targeted areas.

DESCRIPTION

Many targeted methods will be used in Census 2000:

- The regional census centers will use 1990 Census data and their knowledge of local conditions to identify the most appropriate areas in which we might use targeted methods designed to overcome difficult enumeration barriers.
- This information will be shared with officials of local and tribal governments. In close consultation with these officials, we will then identify, in advance, areas that likely will require additional "get out the count" efforts.
- A team or crew of enumerators will go into a targeted area and conduct the enumeration in a short period of time. Team enumeration will be used in areas where field conditions may interfere with the timely completion of the enumeration. These conditions may be high concentrations of multiunit buildings, enumerator safety concerns, low enumerator production rates, and so forth.
- A Be Counted National campaign will make unaddressed Be Counted questionnaires available in sites such as Walk-in Questionnaire Assistance Centers and other publicly accessible locations for

pick up and completion by people who believe that they have not been counted in the census.

- Mail response rates and maps will be available to local and tribal officials periodically during the census enumeration. They will work in partnership with census staff to identify unexpectedly low response areas. Targeted enumeration efforts and additional outreach and publicity activities then will be implemented.
- In partnership with local and tribal governments and community-based organizations, the local census offices will establish Walk-in Questionnaire Assistance Centers in their communities (for example, in non-English speaking areas) to assist respondents in completing their questionnaires. These centers will be established in community centers, large apartment buildings, and so forth.
- Assistance in various foreign languages will be provided for people who are not able to respond to questionnaires in English or Spanish.

MILESTONES

March 2000	Open Walk-in Questionnaire Assistance Centers
March 31-April 12, 2000	Conduct Be Counted Campaign

IX.G. VACANT HOUSING UNIT FOLLOWUP

OBJECTIVE

To verify the accuracy of vacant housing unit information provided to the Census Bureau by the U.S. Postal Service (USPS).

MAJOR FEATURES

- A 30-percent sample of housing units designated as vacant by the USPS will be selected for followup during the nonresponse followup operation by census enumerators to determine if those units were truly vacant on Census Day. This will ensure the integrity of the vacancy information provided by the USPS.
- We also will gather information about the characteristics of those vacant housing units. Additional vacant units will be encountered by enumerators during nonresponse followup that were not designated as such by the USPS.
- As a final check, the consistency of the vacancy rates with independent estimates and historical data will be assessed.

MILESTONES

April-June 2000	Conduct vacant housing unit followup (as part of the nonresponse followup operation)

IX.H. LARGE HOUSEHOLD FOLLOW-UP

OBJECTIVE

To obtain Census 2000 data for all residents of households with more than five persons.

MAJOR FEATURES

Both short- and long-form census questionnaires will allow for up to five persons to provide census information about themselves. If the person filling out the questionnaire indicates that there are six or more persons in the housing unit, the Census Bureau will conduct a followup operation to obtain information for the additional residents.

MILESTONES

April-June 2000	Conduct large household followup

IX.I. UNDUPLICATION OF RESPONSES

OBJECTIVE

To eliminate duplicate addresses and questionnaires in Census 2000.

MAJOR FEATURES

One of the main goals of Census 2000 is to make it simpler for people to be counted. In addition to our standard enumeration methodology for an area (for example, mailout/mailback data collection), census forms will be made readily available in public places and provided in multiple languages. Responses to the census also will be accepted over the telephone. Providing these response options will make it easier for persons to be counted but may increase the possibility that multiple responses will be submitted for a given person and household.

A complete, accurate address list, high speed data capture capabilities, along with automated matching technologies, will be the keys to avoiding the duplication of people and residences. The control of the enumeration of Census 2000 will be based on an address list called the Master Address File (MAF). Every housing unit in the census will have a unique identifier. Every response to the census will be data captured and then linked to an address in the MAF using powerful matching computer programs to assign the identifier. Once a response is linked to the MAF, we will be able to determine when multiple returns for a housing unit have been submitted. Matching tools again will be applied to identify and correct instances of duplicate counting of individuals.

Unduplication of multiple responses in past censuses would have required a massive clerical operation since only a small subset of person names was data captured. An automated matching capability was not feasible without the names of each of the persons on census forms. It would have been necessary to clerically compare the information on the individual forms and then feed the results into the computer.

Since the 1990 census, we have embarked on a path that will ensure timely, complete capture of all census responses. This includes the telephone call-ins of census responses, in addition to the commitment to use imaging technology with electronic optical mark and intelligent character recognition for the data capture of information from the paper forms. High speed capture will allow the Census Bureau to accelerate the process of capturing the names and demographic characteristics of all persons on the paper forms.

The advances in computer technology in the areas of computer storage, retrieval, and matching, along with image capture and recognition, have now given the Census Bureau the flexibility to provide multiple response options without incurring undue risk to the accuracy of the resulting census data.

As a further safeguard of the quality of the census enumeration, we will develop statistical procedures to identify areas from which we receive unusually large numbers of unaddressed Be Counted questionnaires and will verify the validity of the census responses.

MILESTONES

June-July 2000	Conduct unduplication of multiple responses

IX.J. COVERAGE EDIT

OBJECTIVE

To improve the coverage of persons in housing units in Census 2000.

MAJOR FEATURES

In Census 2000, a coverage edit will be performed to review Census 2000 questionnaires for potential missing people. After the Census Bureau receives the questionnaires, they will be checked to see if there is any discrepancy between the number of persons reported as members of that household and the number of persons for whom census information was provided on the form. For example, the respondent may have indicated that five people lived in the housing unit, but there was information for only two people. For these discrepancies, telephone clerks will call the household to resolve the problem. There will be no personal visit followup for households with reporting discrepancies that we cannot reach by telephone.

The coverage edit should not be confused with the quality check survey (Integrated Coverage Measurement), the edit and followup of large households, or the content edit (for missing or incomplete responses to population or housing items). (The content edit in Census 2000 will be completed solely by computer with no telephone or personal visit followup.)

MILESTONES

March 2000	Identify housing units requiring coverage edit followup
March 2000	Conduct coverage edit followup operation

IX.K. NONRESPONSE FOLLOWUP STRATEGY

OBJECTIVE

The Census Bureau will make every effort to secure a response in Census 2000 from every resident and every housing unit. Following that, and to ensure an acceptable response among all census tracts, the Census Bureau will use statistical sampling to complete the enumeration in each census tract.

MAJOR FEATURES

- During the initial response period (the period immediately before and immediately after Census Day), the Census Bureau will issue reminder publicity urging people to return their questionnaires, fill out Be Counted questionnaires, or use the telephone to provide their census responses.
- After the initial response period, the Census Bureau will determine the response rate for every census tract, which is a neighborhood that has an average of about 4,000 people. The response rate is defined as:

$$\frac{\text{Mail + Telephone + Other Responses}}{\text{Questionnaires Mailed or Delivered}} \times 100\%$$

- For any census tract in which this rate is less than 100 percent, the Census Bureau will select a sample of nonresponding addresses. The sample will vary from census tract to census tract based upon the particular response level and will be designed to achieve at least a 90-percent total response rate in each census tract.
- Enumerators will perform NRFU for each of the selected sample addresses. The addresses will be

visited by an enumerator who will complete a questionnaire by personal interview.

- The Census Bureau will not use sampling to complete the enumeration on American Indian reservations, or in Alaska Native Village statistical areas, the U.S. Virgin Islands, or the Pacific Island Areas.

MILESTONES

January 1997	Determined NRFU plan for Census 2000
April-June 2000	Conduct NRFU

IX.L. QUALITY CHECK (INTEGRATED COVERAGE MEASUREMENT) SURVEY

OBJECTIVE

To produce a "one-number" census estimate of the U.S. population in Census 2000 that will improve accuracy, reduce costs, and eliminate confusion and controversy caused by having more than one number measuring the same population.

MAJOR FEATURES

In Census 2000, the Census Bureau will conduct a "one-number" census of population and housing. That is, there will be just one set of official census results produced by the legal deadlines. In recent past censuses, the population counts were represented by two sets of numbers: the number of people actually counted and the number of people estimated to be living in the United States, after compensating for enumeration errors. Figure IX-1 provides a summary of this process.

The quality check of Census 2000 results, known as the Integrated Coverage Measurement (ICM) Survey, will be composed of three phases:

- Housing Unit Phase
- Quality Check Computer Assisted Person Interview (CAPI) Phase
- Person Matching Phase

Housing Unit Phase

During this phase, housing units within the sample blocks will be listed independently of the census and later matched to the census inventory of housing units. After reconciling the differences, a list of housing units

that are confirmed to have existed within the sample blocks on Census Day will be prepared for conducting quality check computer assisted person interview.

Quality Check Computer Assisted Person Interview Phase

In this phase, the interviewer will collect information about the current residents and anyone who has moved out of the sample block between Census Day and the time of the interview. The interviewer will ask questions about alternate residences to establish where people lived on Census Day according to census residence rules. Interviews will be conducted either by telephone or personal visit. Telephone interviews will be conducted before the completion of the initial phase of the Census Nonresponse Follow-up operation for the sample area, but will include only a sub- set of households in the sample area that, in addition to meeting other established criteria, returned their census questionnaires and provided their telephone numbers. After the conclusion of the Census Nonresponse Follow-up operation for a sample area, all remaining sample cases will be interviewed using a CAPI person-to-person approach. Telephone interviews may also be used later in the process for hard to enumerate areas or situations.

Person Matching Phase

In this phase, the people counted in the quality check survey will be compared with those enumerated in the census. After the matching is completed, a field CAPI Person Follow-up interview is conducted for reconciling selected cases. After this person phase is completed, using statistical procedures, the Census Bureau will produce estimates of people missed or duplicated in the

census enumeration. These estimates then will be used to update the final census data files to produce the one-number census results.

MILESTONES

April 1999	Select quality check sample
July-December 1999	Conduct housing unit listing phase
January-March 2000	Conduct housing unit matching and followup phase
April-July 2000	Conduct quality check person interviewing phase
July-September 2000	Conduct person matching and followup phase
October-November 2000	Conduct missing data and estimation procedures
December 2000-March 2001	Create P.L. 94-171 redistricting data products

Figure IX-1. The Path to a One-Number Census

(Chart Omitted)

IX.M. POTENTIAL EFFECT OF NONRESPONSE FOLLOWUP AND QUALITY CHECK (INTEGRATED COVERAGE MEASUREMENT) SAMPLING OPTIONS

The Census 2000 plan calls for the innovative use of statistical sampling for conducting two major census operations. These operations are sampling for nonresponse followup (NRFU) and for a quality check called Integrated Coverage Measurement (ICM). These two operations have different goals, but they complement each other.

Sampling for nonresponse will be used to complete the census enumeration. This is a major departure from the process used in previous censuses. Rather than visiting all households that do not provide a response during the initial response period, census enumerators will visit and conduct interviews for a representative sample of those households. Information collected during this operation will be used to estimate the characteristics of the households not included in the sample.

After completion of census NRFU operations, we will conduct a follow-up survey of a representative sample of housing units across the nation. This operation is referred to as the census quality check or ICM survey. This survey is designed to identify people missed in enumerated housing units and in missed housing units, as well as identifying people that were counted in the wrong place or more than once during the initial census enumeration.

The final population estimates are the result of combining information collected from responses to the census, including mail returns and other opportunities to respond (such as on the Be Counted questionnaires or

by phone) with results from the census NRFU and quality check operations.

Because the nonresponse and quality check operations are sample-based, they contribute error to the census population estimates. This error is referred to as **sampling error**. Conversely, the quality check operations should result in a reduction of the largest source of error in previous censuses, coverage error. Coverage error occurs differentially across geographic areas and among different population groups. This error is more commonly referred to as the **undercount**.

Table IX-1 provides a comparison of the 1990 census undercount rates with the potential sampling error for Census 2000 for major racial and ethnic groups for the United States. The two statistics provided for each estimate are as follows:

- Estimated coefficients of variation (CV) for Census 2000 estimates, which account for the error contribution from the nonresponse and quality check sampling operations. A coefficient of variation expresses the error (sampling) as a percent of the population estimate. T hese estimates are based on an empirical simulation using data from the 1990 PES to approximate the results of the 2000 ICM, and will be refined as the ICM design is further developed.
- Undercount rates for the 1990 census, as measured by the 1990 Post- Enumeration Survey. An undercount rate expresses the error (nonsampling) as a percent of the population estimate.

For example, Table IX-1 shows that the 1990 census missed 5.0 percent of the Hispanic population in the United States. The implementation of the Census 2000

plan will introduce a sampling error of 0.8 percent for the Hispanic population but will remove the coverage error for a net improvement of about 4.2 percent.

TABLE IX-1. POTENTIAL EFFECT OF NONRESPONSE FOLLOWUP AND QUALITY CHECK SAMPLING OPTIONS ON ESTIMATES OF THE U.S. POPULATION AND THE MAJOR RACIAL/ETHNIC GROUPS

	Census 2000	1990 Census
Race	Estimated sampling error (coefficient of variation)	Undercount Rate
United States, total	0.1%	1.6%
White, non-Hispanic	0.1%	0.7%
Black	0.6%	4.4%
Asian and Pacific Islander	1.4%	2.3%
American Indian	1.4%	4.5%
Hispanic origin (may be of any race)	0.8%	5.0%

IX.N. DEMOGRAPHIC ANALYSIS

OBJECTIVE

To use independent estimates to validate the quality check estimates and the "one-number" census results in Census 2000.

MAJOR FEATURES

Demographic analysis (DA) represents a macro-level approach to measuring coverage. The demographic approach differs fundamentally from the quality check estimates, which represent a micro-level approach (case-by-case matching).

Demographic estimates of net undercount are derived by comparing census results to estimates based largely on aggregate administrative data. The national estimates for the population below age 65 are derived by the basic demographic accounting equation:

Population = Births - Deaths + Immigrants - Emigrants

Aggregate medicare data are used to estimate the population 65 years and over. To produce estimates below the national level, the equation is modified to allow for domestic migration. Since administrative records are utilized, the DA estimates are derived independently of the census being evaluated.

Use of Demographic Analysis in Census 2000 - Demographic analysis will provide checks at two distinct points in the Census 2000 process. First, DA will be compared with preliminary census results before the quality check operation to provide an early assessment of coverage differentials at the national and state levels. Second, the DA estimates will be used to validate the quality check estimates and ensure the

demographic consistency of the final one-number census results.

Below the state level, we will use independent population and housing estimates, aggregate administrative records, and other analytic tools as benchmarks to assess the quality of the evolving census results. In addition to broad coverage checks of population and housing, this review can identify content problems and possible anomalies due to geocoding and other nonsampling errors.

MILESTONES

August 1998	Implement features of DA in Dress Rehearsal
February 2000	Evaluate quality/completeness of MAF
August 2000	Evaluate quality/completeness of "pre-quality check" census results
December 2000	Validate quality check estimates and one-number census results

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Section X. American Indian and Alaska Native Areas and Hawaiian Homelands

X. AMERICAN INDIAN AND ALASKA NATIVE AREAS AND HAWAIIAN HOMELANDS

OBJECTIVE

To conduct the best possible enumeration in Census 2000 of American Indian and Alaska Native Areas (AIANA) and Hawaiian Homelands.

MAJOR FEATURES

The Census Bureau will base its strategy for enumerating the populations in AIANA and in Hawaiian Homelands on building partnerships for:

- Address list development
- Geographic programs
- Outreach and promotion
- Field operations
- Data collection methodologies
- Data processing and dissemination

Address List Development

In areas where the U.S. Postal Service (USPS) delivers mail to city style addresses, we will use the USPS Delivery Sequence File to build the address list and use the mailout/mailback methodology for enumeration. In other areas, we will conduct an address listing operation prior to the census and use the update/leave with respondent mailback of the questionnaire methodology. In more remote areas, we will use the list/enumerate methodology. Tribal governments will have an opportunity to review the address list for their jurisdiction as part of the LUCA program. (See page VI-5.)

Geographic Programs

Table X-1 shows the wide diversity of programs the Census Bureau will offer American Indian tribes, Alaska Native areas, and Hawaiian Homelands to review and define geographic areas.

Outreach and Promotion

Census Bureau staff and tribal liaisons will compile a listing of all electronic and print media within the marketing area for paid promotion dissemination. In addition, the Census Bureau will seek the help of tribal liaisons and Complete Count Committees (if the tribes form them) to assist with outreach (census awareness and education) and the promotional campaign, using national or local materials.

Field Operations

The Census Bureau plans to obtain assistance with the following activities:

- Provide local office space for testing and training
- Participate in training local census office staff (such as in cultural awareness)
- Assist in recruiting strategies for filling census jobs and identifying local referrals for assistance
- Assist and advise census field staff about potential problem situations
- Attend and participate in periodic census/tribal staff meetings
- Identify sites for Questionnaire Assistance Centers
- Identify locations for distributing Be Counted questionnaires

Data Collection Methodologies

The Census Bureau will work with tribal officials to select the appropriate data collection methodology or combination of methodologies for each area. These methodologies will range from the use of mailing lists with the respondent either receiving a questionnaire in the mail (mailout/mailback) or an enumerator leaving the form for the respondent to return by mail (update/leave) to the enumerator listing the housing unit and conducting the census interview in one visit (list/enumerate).

Data Processing and Dissemination

Census 2000 data collected in the AIANA and the Hawaiian Homelands will be processed and disseminated in the same way as information collected for the rest of the Nation. (See page XII-1.)

MILESTONES

September 1998	Complete holding tribal consultation meetings
April 2000	Complete definition of geographic areas.

Table X-1. Census 2000 Geographic Programs for American Indian and Alaska Native Areas and Hawaiian Homelands

Geographic Program	Type of Area	Purpose of Program
Tribal Review Program	Federally recognized tribes with a land base	Provide boundary and feature updates
Block Definition Project	Federally recognized tribes with a land base and Federally recognized tribes in Oklahoma without a land base	Identify Census 2000 block boundaries
Participant Statistical Areas	Federally recognized tribes with a land base and Federally recognized tribes in Oklahoma without a land base	Define statistical areas such as census tracts, block groups, census designated places, and census county divisions
Tribal Subdivision Program (Proposed)	Federally recognized tribes with a land base	Designate special subdivisions (NEW)
Tribal Jurisdiction Statistical Area Program	Federally recognized tribes in Oklahoma without a land base	Delineate an identifiable land area as a tribal jurisdiction statistical area
Tribal Designated Statistical Area Program (Proposed)	Federally recognized tribes outside Oklahoma without a land base	Delineate an identifiable land area as a tribal designated statistical area
Alaska Native Regional Corporation Program	Alaska Native areas	Alaska Native Regional Corporations review and update boundaries

Alaska Native Village Statistical Area Program	Alaska Native areas	Alaska Native Regional Corporations delineate, review, and update boundaries for these areas
State Reservation Program	State recognized tribes with a land base	State government liaison can review and update boundaries
State Designated American Indian Statistical Area Program (Proposed)	State recognized tribes without a land base	Replaces 1990 Tribal Designated Statistical Area program for state recognized tribes
Hawaiian Homelands (Proposed)	Areas recognized by the Department of Hawaiian Homelands	New program to identify and include Hawaiian Homelands in TIGER data base

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Section XI. Telecommunications Support and Automated Data Processing

XI.A. TELECOMMUNICATIONS SUPPORT

OBJECTIVE

To provide the infrastructure necessary to support the Census 2000 telecommunications requirements.

MAJOR FEATURES

The planned Census 2000 telecommunications network will encompass communication links between the following facilities:

- Census Bureau Headquarters in Suitland, Maryland
- 12 Regional Offices (ROs)
- Bowie, Maryland Computer Center
- 12 Regional Census Centers (RCCs)
- Jeffersonville, Indiana Data Capture Center (DCC)
- 3 contracted Data Capture Centers (DCCs)
- Approximately 520 Local Census Offices (LCOs)

In addition, we intend to establish communication links to the planned opening of commercial telephone centers to support Telephone Questionnaire Assistance.

Figure XI-1 shows the Wide Area Network (WAN) diagram for Census 2000. We plan to use Asynchronous Transfer Mode (ATM) as our communications link (via frame relay or another type of dedicated link) between Headquarters, Bowie Computer Center, and the DCCs. The ROs, RCCs, and LCOs will be linked to the frame relay cloud (the communications network provided by the telephone company) via leased T1 communication lines.

MILESTONES

Define telecommunications requirements for:

Currently operational	Bowie Computer Center
October 1995-April 1997	Regional Census Centers
January 1996-March 1997	Jeffersonville Data Capture Center
January 1996-March 1997	Contracted Data Capture Centers
July-September 1997	Local Census Offices

Figure XI-1. Census 2000 WAN DIAGRAM

XI.B. DATA CAPTURE SYSTEM

OBJECTIVE

To utilize the best available data capture methodology in Census 2000.

MAJOR FEATURES

The Census 2000 data capture methodology must utilize the best available technology that will accommodate the use of respondent-friendly questionnaires. The Census Bureau has identified components of the data capture process that may be best performed and provided by private-sector partners. The Census Bureau will be able to take advantage of available commercial off-the-shelf hardware and software representing technological advancements in information technology and systems without limiting itself to creating in-house solutions.

The following are the most significant features of the Data Capture System 2000 (DCS 2000):

- Four centers will be responsible for data capture and data processing functions.
- A full electronic data capture and processing system will record an image of every questionnaire.
- Mail-return questionnaires will be sorted automatically to ensure timely conversion and capture of critical information needed before nonresponse follow-up activity begins.
- Optical mark recognition (OMR) will be used for all check-box data items.
- Intelligent character recognition (ICR) will be used to capture write-in character-based data items.
- Key-from-image will capture and/or resolve difficult ICR cases.

- Quality assurance will be conducted on data keying and scanning activities.
- Paper questionnaires will be handled only at the beginning of the data capture process: during check-in, forms preparation, and scanning. To the maximum extent, all subsequent operations will be accomplished using the electronic image and captured data, reducing the logistical and staffing requirements for handling large volumes of paper questionnaires.

MILESTONES

March 1997	Awarded Data Capture System 2000 contract
March 1997-May 1997	Prepared system development plan
March 1997-June 1997	Prepared operations and facilities plan
March 1998-July 1998	Demonstrate plan
January 1998-June 1998	Finalize Operation Facility Plan
January 1998-September 1999	Open data capture centers/install equipment
March 2000	Begin data capture of Census 2000 forms

XI.C. AUTOMATED DATA PROCESSING SYSTEM

OBJECTIVE

To develop an effective and efficient system for controlling, managing, and processing Census 2000 data.

MAJOR FEATURES

The Census 2000 Data Processing System will be a complex network of operational controls and processing routines intended to store and service the decennial control and data requirements. It will include the necessary interactions with the Master Address File (MAF), Operations Control System (OCS) 2000, Data Capture System 2000 (DCS 2000), and Telephone Questionnaire Assistance (TQA), not only to control, accept, and store the data but also to provide the necessary computer processing to produce a one-number census.

The Census 2000 Data Processing System is divided into three operational phases of precensus, census, and post-census activities.

- Precensus activities will be those required for converting the MAF into the decennial control data base that remains linked to both TIGER®* and the MAF. These activities will include form sampling (long or short), targeting identifications (for example, with foreign language questionnaires), and preparing the address files for printing on the questionnaires. Control information (both geographic and address related) will be provided to the OCS 2000 for guiding both field canvassing and address capture processing.

*TIGER® is a registered trademark of the U.S. Bureau of the Census.

- Activities concurrent with census data collection/capture will be those necessary to coordinate the check in and storage from the multiple sources of collection (DCS 2000, Be Counted questionnaires, and telephone), to define the responding/ nonresponding universes, and to provide enumeration controls and workload to the field. Included in these activities will be the loading and updating of the central data bases for the storage of all census responses provided through the enumeration and data capture processes.
- Post-census activities will be those necessary to prepare data from the original responses for release. These activities will include unduplicating multiple responses, editing and imputation, coding of write-in response data (such as race, language, industry and occupation, place of work/ migration), estimation, tabulation recoding, and data disclosure avoidance.

In addition, detailed data files will be prepared from information collected on the short- and long-form questionnaires. These activities will include editing the responses, applying statistical techniques to account for missing data, and applying weights to sample records from the long form questionnaires. The files will be provided to DADS for data dissemination.

MILESTONES

July 1999	Receive the Census 2000 MAF
September 1999	Send initial address files to printing contractors
April 2000	Define nonresponse followup universe and samples
May-August 2000	Code write-in response data
August-September 2000	Process 100-percent edits and imputations
September 1999-January 2001	Process 100-percent estimations, disclosure avoidance, and tabulation recoding
December 2000-January 2001	Provide 100-percent estimated and edited files to DADS
June-August 2001	Prepare detailed data files from information collected on long-form questionnaires and provide to DADS

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Section XII. Dissemination and Products

XII.A. TABULATION AND DISSEMINATION PROGRAM

OBJECTIVE

The Tabulation and Dissemination Program for Census 2000 will be significantly different from those of previous censuses. By taking advantage of new technology, the Census Bureau will be able to meet customer demand for faster and more flexible access to census data.

MAJOR FEATURES

Census 2000 data will be disseminated mainly using the Data and Access Dissemination System (DADS). Still in the developmental stages, DADS will provide an interactive electronic system that will allow data users to access prepackaged data products, data documentation, and on-line help, as well as build custom data products on-line and off-line. Figure XII-1 depicts the various products available through DADS.

Certain data products—such as those including summary, profile data—will be disseminated in traditional media as well as through DADS. The options and issues related to determining the types of data products and their medium of dissemination have been discussed with various segments of the data user community; these consultations will continue until the final decisions are made. The Census Bureau has solicited the advice and recommendations of data users throughout the planning, design, and testing stages of DADS.

DADS will be accessible to the widest possible array of users through the Internet, Intranet, and all available intermediaries, including the nearly 1,800 Data Centers

and affiliates, the 1,400 Federal Depository libraries and other libraries, universities, private organizations, and so forth.

DADS is being designed with the capability to:

- Provide access to Census 2000 data such as the type of information shown in 1990 census Summary Tape Files (STFs) and Public-Use Microdata Samples (PUMS). Data users will have online viewing, downloading, and ordering capabilities.
- Create customized products, including various display formats such as tables, charts, graphs, and maps based on Census Bureau or user-defined geographic areas.
- Furnish metadata that provides documentation and explanatory information for data subjects and geographic areas.
- Provide users with an on-line help feature for using the system and accessing census data, as well as instructions on how to seek further assistance.

There are many issues concerning Census 2000 data dissemination that we must resolve in-house and with the data user community. We plan to work with data users during the next couple of years to answer two broad questions (as well as some more detailed issues) that will help finalize the overall design of the 2000 Tabulation and Dissemination Program. The questions are as follows:

1. Since data can be downloaded by data users from DADS onto other media (for example, CD-ROM, diskette, and paper), what proportion of Census Bureau resources should be used to generate CD-ROMs and

printed reports? (Should any other media be considered?)

2. Since some segments of the data user community have less access to computers, how should their data needs be met and how can the Bureau work with partners and stakeholders to provide access for these data users?

Also, data users will be asked for recommendations on the types of data to be predefined in DADS and included in various data products. Our ongoing channels of communication will continue to inform them on the progress of DADS, such as through meetings and workshops with specific groups and organizations, and articles in census publications.

MILESTONES

September 30, 1996	Released DADS Prototype 1, "proof of concept" for basic design, technology, and functionality of DADS
October 31, 1997	Released DADS Prototype 2, with expanded functions such as data product creation and on-line help
January-April 1999	DADS begins release of Dress Rehearsal product prototypes for Census 2000 (redistricting data first, other 100-percent and sample data to follow)
January 2001	DADS begins release of Census 2000 redistricting data products
March 31, 2001	DADS completes release of redistricting data to states

XII.B. P.L. 94-171 REDISTRICTING DATA PROGRAM

OBJECTIVE

To satisfy the requirements for Public Law (P.L.) 94-171, the Census Bureau established the Census 2000 Redistricting Data Program. This program offers the redistricting officials in each state the opportunity to provide the information used by the Census Bureau to create the geography for tabulating their redistricting data. By using the state-provided geographic information, the Census Bureau can furnish redistricting data and related geographic products that enable the states to complete Federal and state redistricting according to their specific state deadlines.

MAJOR FEATURES

The Census 2000 Redistricting Data Program consists of:

Phase 1, the Block Boundary Suggestion Project, offers state redistricting officials the opportunity to identify visible features that they suggest be held as Census 2000 block boundaries. The Census Bureau will identify these boundaries in its TIGER®* data base and, once agreed upon, hold them as block boundaries for tabulation of Census 2000.

Phase 2, the Voting District Project, is the phase where state redistricting officials may submit the boundaries and geographic codes of the voting dis

*TIGER® is a registered trademark of the U.S. Bureau of the Census. For ease of presentation, the trademark symbols for TIGER and TIGER-related products are omitted from the text.

tricts (election precincts) and state legislative districts using whole census blocks. The Census Bureau will insert these boundaries into the TIGER data base.

Phase 3, Release of Census 2000 Redistricting Data, is the dissemination of Census 2000 data and accompanying geographic products to the governor and majority and minority legislative leaders responsible for redistricting in each state. States that provided voting districts will receive their data tabulated by voting district. States that provided state legislative districts will receive their data tabulated by state legislative district. The products, in paper and electronic form as appropriate, include:

- Data files for standard tabulation areas (for example, county, city, census tract), census block, and—when provided by the state—voting districts and state legislative districts: broken down by major race groups and Hispanic origin, for the total population and for persons 18 years and over
- TIGER/Line files (including voting districts and state legislative districts when provided by the state)
- County Block Maps (displaying voting districts when provided by the state)
- Voting District Outline Maps (displaying state legislative districts when provided by the state)
- Census Tract Outline Maps
- *Congressional District Atlas*, 108th Congress of the United States, in digital form and as a printed report, including a series of maps and tables from the TIGER data base for the districts of the 108th Congress resulting from the Census 2000 reapportionment
- Wall map of the United States by the Congressional Districts of the 108th Congress

The Census Bureau is required by P.L. 94-171 to deliver redistricting data/geographic products to the states within one year after Census Day. Individual states have their own timing requirements for the completion of state and Federal redistricting. Priority processing of census data and geographic products will be given to those states that must complete redistricting early.

MILESTONES

January 1999	Complete Phase 1, Block Boundary Suggestion Project
January 1999	Begin Phase 2, Voting District Project
March 31, 2001	Complete Phase 3, release of P.L. 94-171 redistricting data/geographic products to states
January 2003	Release *Congressional District Atlas*, 108th Congress

XII.C. GEOGRAPHIC PRODUCTS

OBJECTIVE

The requirements for Census 2000 are not just to collect, tabulate, and disseminate data, but to relate these data to geographic entities. Data for smaller geographic areas are necessary to meet the requirements of redistricting and numerous other Federal, state, and local programs. So that data users may understand and effectively use census data, the Census Bureau provides geographic products and appropriate tools to identify the names, boundaries, codes, and other attributes of the geographic entities.

MAJOR FEATURES

The names, boundaries, and attributes of the geographic entities for which we tabulate data are identified through a variety of means, including internal Census Bureau operations and participant programs with state, local, and tribal governments and regional and metropolitan planning agencies. We also work with these participants to update the features—including their names and address ranges—shown in our geographic data base.

We incorporate the information relating to the geographic entities and features into the TIGER®* data base. We prepare extracts from TIGER for use in conducting the census and in tabulating and disseminating census data. (Special geographic extracts from the TIGER data base will support DADS.)

*TIGER® is a registered trademark of the U.S. Bureau of the Census. For ease of presentation, the trademark symbols for TIGER and TIGER-related products are omitted from the text.

The geographic products planned for Census 2000 are:

- Maps, in digital and hardcopy form. These will include detailed maps (such as the County Block Maps), outline maps (such as the Census Tract Outline Maps), and thematic maps (such as percent of population by county for a specific racial category). We also will generate supporting maps based on a specific data product.
- TIGER Extracts, in digital form (hardcopy may be available). These will include such products as the TIGER/Line files, cartographic boundary files and comparability files. We will generate appropriate supporting TIGER extracts based on specific data products and to support noncensus programs (for example, the TIGER/Census Tract Street Index for the Home Mortgage Disclosure Act).

The geographic entities we report in data products vary. Some geographic entities—and related products—remain constant across data products. Other geographic entities are relevant at different times and in different products. For example:

- Voting districts are a very important geographic entity for P.L. 94-171 geographic products but are not included in the "regular" census products. We prepare special maps and geographic products showing these areas.
- While 100-percent data (from the questions asked of all persons) are available for census blocks, sample data (from the long form) are not. Similarly, some data files will not include certain geographic entities or geographic entities below a certain population (for example, places with populations of fewer than 10,000).

- Reapportionment from Census 2000 will be reflected in the redistricting for the 108th Congress. Initial data files for Census 2000 will contain the districts of the 106th Congress.

MILESTONES

March 31, 2001	Release products for Redistricting Data Program to states
April-May 2001	Release Census 2000 TIGER/Line files
June 2001	Release county block maps, census tract outline maps, county subdivision outline maps
June 2003	Complete release products for districts of 108th Congress

Figure XII.I Data Access & Dissemination System

[DADS]

United States
CENSUS
2000

Section XIII. Testing, Dress Rehearsal, Evaluation, and Research

XIII.A. CENSUS 2000 TESTS AND RESEARCH

OBJECTIVE

The Census Bureau is engaged in an ambitious testing and research program designed to develop new approaches and techniques for possible implementation in Census 2000. The ultimate goal of this program is to boost participation in the census, thereby improving coverage and reducing costs.

MAJOR FEATURES

- Even before the 1990 census data products were completely released, the Census Bureau initiated many tests and research projects (such as focus group and cognitive studies), spanning from 1992 through 1994. Earlier testing was needed to allow time to study fundamental reforms in census design. The following is a summary of these efforts:
  - The earliest tests and research focused on ways to increase the willingness and ability of respondents to respond by mail to the census by using: (1) questionnaire design and mailing package formats that were easier for respondents to understand and complete; and (2) notifications for alerting and reminding respondents to complete the forms.
  - Various testing and research studies were conducted concerning technologies to speed data collection and on ways to give people greater flexibility in how they respond to the census. Other research assessed current and emerging data capture technologies (for example, electronic imaging and optical mark recognition)

that would offer the potential for processing cost reductions.

- Research on automated address list maintenance focused on supporting the development of a continuously updated Master Address File linked to the TIGER data base.
- Considerable testing and research were conducted to study administrative records includeing: examining respondent attitudes about using records held by other agencies, assessing public reaction to collecting social security numbers, investigating various state and local administrative records systems, creating a data base of sources of administrative records, and developing effective methods to use when importing, standardizing, and matching files.

- Then at mid-decade, the 1995 Census Test gave further testing to many procedures and features that had been shown to be successful in the earlier tests and research, along with additional test objectives. This test evaluated 15 activities, among them a multiple mail strategy with respondent-friendly forms, new methodology to count persons with no usual residence, techniques of sampling for nonresponse, mail strategy of Spanish-language forms to targeted areas, and the collection of long-form (sample) data using various length forms (to see how response rates were affected by form length).
- Ongoing cost modeling research developed statistical models using data available from the various census tests being conducted. This research experimented with the prediction of many

variables, such as census response, data collection workloads, and staff sizing of local census offices.

- The 1996 National Content Survey (formally known as the U.S. Census 2000 Test) was the principal vehicle for testing and evaluating subject content for Census 2000. It also provided information on questionnaire design and mailing strategy, and techniques to improve coverage.
- The 1996 Race and Ethnic Targeted Test (formally known as the 1996 Census Survey) was the principal vehicle for testing and evaluating several major alternatives for asking the race and ethnic questions. It studied how the proposed alternatives affected the distribution and quality of responses compared with the 1990 questions.
- The 1996 Community Census tested various features of the quality check (Integrated Coverage Measurement Program) on two American Indian reservations and in an urban site. Some of these features included techniques for measuring coverage in housing units and noninstitutional group quarters, use of administrative records for coverage improvement, and experimental questions designed to enhance address listing procedures.

XIII.B. CENSUS 2000 DRESS REHEARSAL

OBJECTIVE

The purpose of the Census 2000 Dress Rehearsal is to prove-in all the various operations, procedures, and questions that are planned for Census 2000 under as near census-like conditions as possible.

MAJOR FEATURES

The Dress Rehearsal will provide for operational testing of Regional Census Center, Local Census Office, and Data Capture Center procedures and systems planned for use in Census 2000. We will employ the full array of methods, techniques, materials, work flows, equipment applications, and promotion and outreach programs intended for use in Census 2000. Attachment C provides more detail about the methods used in the Dress Rehearsal sites.

New procedures being considered for Census 2000—such as respondent-friendly forms readily available in many locations, multiple mail contacts with each household, digital capture of forms, and statistical estimation techniques—have all been tested individually in earlier operations. The Dress Rehearsal will provide a census-like environment to test simultaneously those procedures planned for use in Census 2000. The Dress Rehearsal also may include some procedures and systems that have not been tested operationally in any prior field or processing activity because they are needed to meet new requirements.

The Census Bureau plans to launch an unprecedented partnership effort for the Dress Rehearsal and Census 2000. For the Dress Rehearsal, the Bureau intends to work closely with state, local, and tribal governments,

community organizations, and others to conduct a wide range of census activities. For example, the Bureau will ask local and tribal governments to review the Master Address File to ensure its completeness and accuracy. Other partnership efforts will include working closely with local and tribal governments in implementing the promotion and outreach program, and to facilitate the availability of census questionnaires. The Dress Rehearsal communities will work with the Bureau as exclusive partners in the final evaluation of planned Census 2000 operations.

From the Dress Rehearsal, we will produce prototype redistricting data products required by P.L. 94-171, and minimal standard printed and machine-readable 100-percent and sample data products.

Sites

The Census Bureau has selected three sites for the Census 2000 Dress Rehearsal. The sites are the city of Sacramento, California; 11 counties in an area near and including the city of Columbia, South Carolina; and the Menominee American Indian Reservation, Wisconsin. The combination of a large urban site, a small city-suburban-rural site, and an American Indian Reservation site will provide a comprehensive testing environment for refining planned Census 2000 methodology. These three sites reflect characteristics that we believe will provide a good operational test of Census 2000 procedures and systems.

- Sacramento, California

  This site consists of the city of Sacramento, which had a 1990 census resident population of 369,365 and 153,362 total housing units. The Census

Bureau's official 1994 estimate showed an increase in the city's population to 373,964.

Sacramento contains great racial and ethnic diversity, including significant African American, Hispanic, and Asian and Pacific Islander populations. This diversity will allow us to test proposed Census 2000 methods designed to reduce the differential in the count and produce an accurate census for all components of the population. Sacramento is also a primary media market, which will allow us to implement a prototype of the Census 2000 advertising program. The site, representing the size of a typical urban local census office in Census 2000, will provide an understanding of the effectiveness of census operations and systems in this environment..

- Columbia, South Carolina

  This site contains the city of Columbia in its entirety, including a small portion in Lexington County; the town of Irmo in its entirety, which is in Richland and Lexington Counties: and the following contiguous counties in north central South Carolina:

Chester	Kershaw	Newberry
Chesterfield	Lancaster	Richland
Darlington	Lee	Union
Fairfield	Marlboro	

  The 1990 census found that the counties comprising the Columbia site had a resident population of 650,035 and 251,874 total housing units. Our official 1996 estimates showed an increase for the 11 counties to 671,234 persons and 290,095 housing units.

The Columbia site exhibits the characteristics of a small city-suburban-rural area that contains living situations and socioeconomic characteristics that we do not find in a predominately urban environment. This site provides our only opportunity to test procedures for developing a Master Address File in an area containing both city style addresses (house number and street name) and non-city style addresses (rural route or box number). The site offers a mix of difficult and presumably easy-to-enumerate areas in a suburban and rural setting.

In the Columbia site, we will not use sampling and estimation techniques to produce the census counts. Instead, we will conduct a 100 percent followup of households that do not respond by mail or telephone. We also will conduct a post enumeration survey (PES) in the Columbia site to evaluate the accuracy of the results only. Attachment C provides more details about this alternative methodology.

- Menominee American Indian Reservation, Wisconsin

  The Menominee American Indian Reservation is located in northeastern Wisconsin. Based on the 1990 census, the Menominee Reservation had a resident population of 3,397 and 1,176 total housing units. Menominee County had a 1990 resident population of 3,890 and 1,742 housing units. (The Menominee Reservation and Menominee County share the same exterior boundary, but pockets of interior land totaling over 2 square miles that are part of the county are excluded from the reservation. The Dress Rehearsal will include the entire

county, however.) The Census Bureau's official 1996 estimates for Menominee County showed an increase to 4,609 persons and 1,899 housing units.

Conducting the Dress Rehearsal on an American Indian reservation allows the Census Bureau to test proposed Census 2000 methodologies for reducing the differential in the count among this component of the population. The Menominee Reservation has a high proportion of American Indians living on it and was recommended by the Census Advisory Committee on the American Indian and Alaska Native Populations.

MILESTONES

August 1997	Address lists developed and updated
October 1997	Address lists reviewed and corrected by local and tribal officials
December 1997	Local census offices opened
April 18, 1998	Census Day
July 1998	Complete census data collection
November 1998	Complete quality check/PES data collection
November 1998	Complete census and quality check/PES processing
December 1998	Release site counts
January 1999	Release prototype P.L. 94-171 redistricting products
March 31, 1999	Complete Dress Rehearsal evaluations

XIII.C. QUALITY ASSURANCE

OBJECTIVE

To detect and correct performance errors that can significantly affect coverage and data quality.

MAJOR FEATURES

Census 2000 Quality Assurance (QA) activities will cover critical precensus, data collection, and data processing operations. QA plans will be developed for the following activities:

- Field geocoding
- Field address listing, validation, and/or map spotting
- Printing of public use forms
- Input materials
  - Map production
  - Assembly kits - materials used by enumerators in the field
- People-assisted data collection operations
  - Personal field interviewing
  - Computer Assisted Personal Interviewing
  - Computer Assisted Telephone Interviewing
- Data Capture modes
  - Intelligent character recognition
  - Optical mark recognition
  - Keying from paper
  - Keying from imaging
  - Scanning
  - Digitizing
- Clerical or automated matching and coding

Each of these operations is designed and implemented to meet decennial objectives. The QA is tailored not only to eliminate significant nonsampling errors, but also to be integrated efficiently into the operation work flow.

MILESTONES

January 1998-January 1999	QA on geographic support activities (geocoding, digitizing, and map production)
August 1998-July 1999	QA on address listing and validation
July 1999	QA on printing public use forms
April 2000	QA on people-assisted data collection
April 2000	QA on data capture operation

XIII.D. CENSUS 2000 EVALUATION PROGRAM

OBJECTIVES

To obtain information about the quality of Census 2000 data and to provide information for future census planning.

MAJOR FEATURES

Evaluations of key components of Census 2000 will be planned before and implemented during the Census 2000 process. Evaluation results will be released in the form of a Report Card on Census 2000. The Census Bureau intends to release certain components of the Report Card by December 31, 2000.

The components of Census 2000 to be evaluated will fall into three broad categories:

- Quality check evaluations
- Coverage improvement evaluations
- General evaluations

MILESTONES

January 1998	Define components of Census 2000 Dress Rehearsal Report Card.
January 1999	Release Census 2000 Dress Rehearsal Report Card
April 1999	Finalize plan for Census 2000 Report Card. This plan will reflect what we learned from the Census 2000 Dress Rehearsal Report Card as well as from our many internal/ external consultations.
October 1999-December 2000-January 2001	Implement evaluation studies Issue Census 2000 Report Card with or shortly after release of the Census 2000 counts by December 31, 2000.
Beyond January 2001	Some evaluation studies may be prepared and issued.

XIII.E. RESEARCH AND EXPERIMENTATION PROGRAM

OBJECTIVE

To conduct a program of research and experimentation during the Census 2000 cycle that will provide information for planning the 2010 census.

MAJOR FEATURES

As part of each decennial census since 1950, the Census Bureau has incorporated a research program to gather data needed to facilitate planning for the next census. For Census 2000, the Census Bureau will conduct experiments and research on different aspects of decennial census activities to assess alternative methods that may be considered in planning the 2010 census. These research activities will be coordinated and managed in a comprehensive research program.

The process for managing this program will involve the following:

- Develop criteria for selection of research
- Solicit ideas for research
- Review proposals and select research based on pre-identified criteria and resources
- Ensure that implementation of research is coordinated with all participating Census Bureau divisions
- Monitor budget and schedules for research
- Review results and coordinate the documentation of results into a Census 2000 results memorandum series

MILESTONES

September 1997	Defined selection criteria for research and experimentation program
November 1997	Solicited ideas for research and experimentation
March 1998	Identify experiments to be included
October 1998-December 2000	Implement experiments
January 2001-December 2003	Document results of research and experiments

XIII.F. ADMINISTRATIVE RECORDS

OBJECTIVE

To explore the feasibility of using administrative records in decennial censuses.

MAJOR FEATURES

The Census Bureau is evaluating the feasibility of using administrative records to supplement or improve traditional data collection methods. The Census Bureau plans to include an experiment in Census 2000 in parallel with standard methods to provide a basis for analysis and future decision making with regard to an expanded use of administrative records in the 2010 census. To support this experimentation, the Census Bureau will develop an administrative records system using selected federal records.

Developing an administrative records system for experimentation in Census 2000 involves the following:

- Identify and acquire administrative record files from selected national programs that contribute to coverage and to demographic characteristics
- Develop methods to evaluate the quality of the administrative record system and the component files
- Develop methods for generating national level administrative record files
- Conduct experiments in Census 2000 to support planning for the 2010 census

An administrative records research agenda has been established to identify relevant issues and the corresponding research projects that are required. In addition, the Census Bureau is conducting privacy

research to gauge public acceptance of administrative records use.

MILESTONES

April 1997	Conducted privacy group meetings on use of administrative records
March 16, 1998	Evaluate 1996 Community Census use of administrative records
September 1, 1998	Generate1998 administrative record files
January 31, 1999	Evaluate 1998 administrative record files
March 25, 2000	Generate an administrative records national file
April 1, 2000	Generate administrative record site files (AREX 2000)
April 1, 2000	Begin implementation activities for Census 2000 experiments

XIII.G. 2010 CENSUS PLANNING

OBJECTIVE

To carry out a long-range planning and design effort for the 2010 census.

MAJOR FEATURES

Demographic and social changes in the United States will make the year 2010 differ from 2000 even more than 2000 differed from 1990. For example, many of the baby boomers will be out of the work force, the continuing telecommunications revolution will have rounded the corner with a generation of children brought up with computers, several minority groups will have grown considerably as a proportion of the total population, and the World War II generation that relied on social security and medicare will be replaced by those who know they cannot rely entirely on such entitlements. The demographic changes and probable reduction of Federally-run programs will influence the data requirements and the manner in which the census can be taken in 2010. Therefore, as belts continue to tighten, and society and technology continue to change, early planning for the 2010 census may be even more important than it was for Census 2000.

The cornerstone of the 2010 planning effort is the identification of a range of possible designs for the next decade. This range provides the basis for determining the necessary experiments to conduct in Census 2000 (see section "Research and Experimentation Program"), which will provide data necessary for the full analysis of alternatives. Also crucial to the effort is the development of performance measures, such as cost, total quality, managerial feasibility, and total

benefits, which will allow the quantitative comparison of design alternatives.

Along with the determination of possible designs, experiments to study them, and measures to assess them, the 2010 program must include examinations of policy and legislative issues associated with each design, and the implications of census designs on public concerns about privacy and confidentiality.

Finally, because of the long lead time necessary to implement major technological changes, and the powerful impacts of technology on the feasibility of key census activities, an ongoing program of technological research is a necessary adjunct to other 2010 program activities.

Early planning for the 2010 census includes the following features:

- Identification of a continuum of potential designs to guide research efforts
- Implementation of key research contracts to inform tests for Census 2000
- Identification of key experiments, evaluations, and research for implementation in Census 2000
- Participation of staff actively involved in Census 2000 for full integration of concepts
- Early input from stakeholders

MILESTONES

October 1997	Identified continuum of potential designs for 2010
January 1998	Proposed experiments and research for implementation in Census 2000
October 1998	Begin external advisory process for 2010 census
October 1998	Begin implementation activities for Census 2000 experiments
September 2000	Begin documenting empirical evidence for proposed 2010 census designs
September 2001	Define post-Census 2000 experiments and research for 2010 census

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Section XIV.
Puerto Rico

XIV. PUERTO RICO

OBJECTIVES

Census 2000 operations in Puerto Rico will be comparable in scope to stateside activities. The Census Bureau is working in partnership with the government of Puerto Rico—as represented by the Puerto Rico Planning Board (PRPB)—on the program objectives to ensure that Census 2000 meets the legal requirements set forth in Title 13, U.S. Code, as well as the specific data needs of Puerto Rico.

MAJOR FEATURES

Census 2000 operations in Puerto Rico will be built around the same four fundamental strategies to be used stateside:

- *Strategy One:* ***Build Partnerships at Every Stage of the Process***
  - The Census Bureau will develop and sign a Memorandum of Agreement with the government of Puerto Rico that will outline the mutual roles and responsibilities of each party in the conduct of Census 2000 on the Island.
  - In consultation with the PRPB and its local Interagency Committee, census questionnaire content will be developed that meets the legislative and program needs of Puerto Rico.
  - An advertising and promotion campaign designed to build awareness of the census and boost participation will be developed for Puerto Rico that will take into account its specific needs.

- The Census Bureau will conduct an address listing operation in Puerto Rico in 1998. This will allow for the full implementation of the Local Update of Census Addresses (LUCA) program (see page VI-5) and will serve as the basis for use of the update/leave method of data collection on the Island. During the update/leave operation, field enumerators update the address list and map and leave a census questionnaire at each housing unit for the residents to complete and mail back.

- *Strategy Two:* ***Keep it Simple***
  - Using the findings from our census testing and research, the Census Bureau will design user-friendly questionnaires that are simpler and easier for respondents to understand and complete. Forms will be available in both Spanish and English.
  - Census questionnaires and other forms will be made more readily available to respondents and will be placed at Walk-In Questionnaire Assistance Centers and other convenient places where people frequent.
- *Strategy Three:* ***Use Technology Intelligently***
  - Using the update/leave methodology for data collection for the first time in Puerto Rico will give respondents the opportunity to complete the census questionnaires themselves and return them by mail. This will allow the Census Bureau to make use of the same technological advances that will be used stateside.

  - The Census Bureau will make greater use of the telephone as a data collection tool, in addition to its use in providing assistance to respondents with questions about Census 2000.
  - Data users will have access to Census 2000 data and products through the Internet, using the Data Access and Dissemination System (DADS) (see page XII-1). DADS will give users the flexibility to extract and tabulate census data quickly to meet their specific data needs.
- *Strategy Four:* ***Use Statistical Methods***
  - The Census Bureau will use personal visits as well as the telephone to obtain response from households that do not return a census questionnaire.
  - On a daily basis, the Census Bureau will determine the response rate for every census tract, which is a neighborhood or area that has an average of about 4,000 people. The response rate is defined as:

$$\frac{\text{Mail + Telephone + Other Responses}}{\text{Questionnaires Mailed or Delivered}} \times 100\%$$

  - For any census tract in which this rate is less than 100 percent after the initial response period, enumerators will perform nonresponse followup (NRFU) (that is, contact the respondent and complete a census questionnaire).
  - The Census Bureau will select a sample of nonresponding addresses in each census tract

at the end of the initial response period. The sample will vary from census tract to census tract based upon the tract's response level and will be designed to achieve at least a 90-percent total response rate in each tract.

- Enumerators will perform NRFU for each of the selected sample addresses. The addresses will be visited by an enumerator who will complete a questionnaire by personal interview.
- A quality check (Integrated Coverage Measurement) survey will be conducted shortly after the regular enumeration to determine if people and housing units were missed or counted more than once. This survey is designed to eliminate the undercount experienced in the 1990 census and will result in a "one-number" census that accurately reflects the population of Puerto Rico.

MILESTONES

April 1997	Finalized Census 2000 plan for Puerto Rico
October 1997	Completed Phase 1 of Block Boundary Definition Program
February 1998	Finalize Memorandum of Agreement
August 1998	Begin address listing activities
December 1998	Complete questionnaire content determination process
April 1999	Conduct LUCA program
April 2001	Release total counts for Puerto Rico

March 31, 2001	Deliver P.L. 94-171 redistricting counts

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Section XV. Island Areas

XV. ISLAND AREAS

American Samoa, Commonwealth of the Northern Mariana Islands, Guam, and U.S. Virgin Islands

OBJECTIVES

Census 2000 operations in American Samoa, the Commonwealth of the Northern Mariana Islands, Guam, and the U.S. Virgin Islands (collectively referred to as the Island Areas) will be conducted by the Census Bureau in partnership with the governments of each Island Area. These partnerships will work on the program objectives to ensure that Census 2000 meets the legal requirements set forth in Title 13, U.S. Code, as well as the specific data needs of each Island Area.

MAJOR FEATURES

Census 2000 operations in the Island Areas will be built around three of the four fundamental strategies to be used stateside (no sampling operations will be conducted in these Areas):

- *Strategy One:* ***Build Partnerships at Every Stage of the Process***
  - The Census Bureau will develop and sign a Memorandum of Agreement with the Governor of each Island Area that will outline the mutual roles and responsibilities of each party in the conduct of Census 2000 for each Island Area.
  - In consultation with the local Interagency Committee established by each Island Area, the Census Bureau will develop the census questionnaire content that meets the legislative and programmatic needs of each Area.

- An advertising and promotion campaign designed to build awareness of the census and boost participation will be developed for each Island Area that will take into account its specific needs.
- The Census Bureau will conduct the data collection of the Island Areas using the list/enumerate method. This decision was based on recommendations from Island Area representatives and an analysis of the various data collection methodologies. During the list/enumerate operation, field enumerators list the housing units and show their spatial location on a map and enumerate the resients in one visit.

- *Strategy Two:* ***Keep it Simple***
  - Using the findings from our census testing and research, the Census Bureau will design respondent-friendly questionnaires and forms that are simpler and easier for the enumerators to administer and for the respondents to understand and answer. Forms will be available in English and in other languages widely spoken in the Island Areas.
  - Census questionnaires and forms will be made more readily available to respondents and will be placed in convenient places.
- *Strategy Three:* ***Use Technology Intelligently***
  - The Census Bureau will make greater use of the telephone as a data collection tool, in addition to its use in providing assistance to respondents with questions about Census 2000.

- Data users will have access to Census 2000 data and products using the Data Access and Dissemination System (DADS) (See page XII-1). DADS will give users the flexibility to extract and tabulate census data quickly to meet their specific data needs.

MILESTONES

February 1998	Finalize Census 2000 plan for each Island Area
March 1998	Complete questionnaire content determination process
August 1999	Finalize Memorandum of Agreement for each Island Area
March 31, 2001	Release total counts for each Island Area

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Appendixes

APPENDIX A. GLOSSARY OF ABBREVIATIONS AND ACRONYMS

ACF (Address Control File) The residential address list used in the 1990 census to label questionnaires, control the mail response check-in operation, and determine the nonresponse followup workload.

AIANA (American Indian and Alaska Native Area) A Census Bureau term referring to these entity types: American Indian reservation, American Indian trust land, state designated American Indian statistical area, tribal jurisdictional statistical area, tribal designated statistical area, tribal subdivision, Alaska Native Regional Corporation, Alaska Native village, and Alaska Native village statistical area.

ATM (Asynchronous Transfer Mode) A process that increases the amount of information that can be electronically transferred at one time between sites.

CAPI (Computer Assisted Personal Interviewing) A method of data collection using a laptop computer in which the questions to be asked are displayed on the computer screen and responses are entered directly into the computer.

CATI (Computer Assisted Telephone Interviewing) A method of data collection using telephone interviews in which the questions to be asked are displayed on a

computer screen and responses are entered directly into the computer.

CCD (Census County Division) A subdivision of a county that is a relatively permanent statistical area established cooperatively by the Census Bureau and local government authorities. Used for presenting decennial census statistics in those States that do not have well-defined and stable minor civil divisions that serve as local governments.

CD-ROM (Compact Disk - Read Only Memory) An optical disk that is created by a mastering process and used for storing large amounts of data. Unlike standard computer disks and diskettes, CD-ROMs can be used only to read stored data, not to update or change its content.

CFO (Census Field Office) One of approximately 402 temporary Census Bureau offices to be established in Census 2000 to manage address listing field work and conduct local recruiting.

CV (Coefficient of Variation) The ratio of the standard error (square root of the variance) to the value being estimated, usually expressed in terms of a percentage (also known as the relative stan- dard deviation). The lower the CV, the higher the relative reliability of the estimate.

DA (Demographic Analysis) An independent, macro-level approach to validate the quality check estimates and the

"one-number" census results in Census 2000. Estimates using demographic analysis are derived by comparing aggregate sets of data or counts. Records used for demographic analysis include birth and death records, immigration statistics, and Medicare data.

DADS (Data Access and Dissemination System) A generalized electronic system for all access and dissemination of Census Bureau data. This interactive electronic system will be designed to allow efficient and cost-effective access to data generated by the various areas of the Census Bureau. The DADS system will serve as the vehicle for accessing and disseminating data from Census 2000 and from the American Community Survey.

DANC (Decennial Applicant Name Check) This automated system will be used to screen all applicants' backgrounds for criminal histories to facilitate the selection, hiring, promotion, and payrolling of qualified and suitable applicants for the conduct of Census 2000.

DCC (Data Capture Center) One of four decentralized Census Bureau facilities (one permanent, three temporary) that will check in Census 2000 questionnaires returned by mail, create images of all questionnaire pages, and convert data to computer readable format using OMR, ICR, and data keying technologies. The DCCs also will perform other computer proc-

essing activities, including automated questionnaire edits, work flow management, and data storage. Called "processing office" (PO) in previous censuses.

DCS 2000 (Data Capture System 2000) The data capture system that will be used to capture information from census forms. This system will incorporate the following activities: processing more than 120 million incoming forms; digitally capturing and processing billions of bits of information on the forms; converting automatically the image of the form to text-based data; and editing/repairing data that the system is unable to decipher automatically.

DFI (Decennial Field Interface) The collection of systems that will be used in census field offices to control and manage the census data collection effort. It includes, among others, the operations control, payroll and personnel, map production, and management information systems.

DSF (Delivery Sequence File) A computerized file containing all delivery point addresses serviced by the USPS. The USPS updates the DSF continuously as its letter carriers identify addresses for new delivery points or changes in the status of existing addresses.

GQ (Group Quarters) A place where people live that is not the typical household-type living arrangement. The Census Bureau classifies all persons not living in house-

holds as living in group quarters. There are two types of group quarters: institutional (for example, correctional facilities, nursing homes, and mental hospitals) and noninstitutional (for example, college dormitories, military bases and ships, hotels, motels, rooming houses, group homes, missions, shelters, and flophouses).

HH (Hawaiian Homelands) Areas created as a result of the Hawaiian Homes Commission Act of 1920 to provide agricultural, pastoral and residential land for native Hawaiians.

HU (Housing Unit) A house, an apartment, a mobile home, a group of rooms, or a single room that has its own kitchen facilities, a separate entrance, and is occupied as a separate living quarters or, if vacant, intended for occupancy as a separate living quarters.

ICM (Integrated Coverage Measurement) A coverage measurement methodology, also known as the Quality Check Survey, that will be used to determine the number of people and housing units missed or counted more than once in Census 2000. This information is combined with the enumeration results before producing a single set of official census results (the one-number census estimates).

ICR (Intelligent Character Recognition) Technology that uses an optical scanner and computer software to "read" human

handwriting. Sometimes referred to as "optical character recognition" (OCR).

LCO (Local Census Office) One of approximately 520 temporary Census Bureau offices to be established for Census 2000 data collection purposes. Called "district office" (DO) in previous censuses.

L/E (List/enumerate) A method of data collection in which enumerators list each residential address and enumerate the household in one visit.

LHFU (Large Household Follow-up) A census operation that follows up on households that indicated on their census form that there are six or more persons in that housing unit.

LUCA (Local Update of Census Addresses) A Census 2000 program, established in response to requirements of P.L. 103-430, that provides an opportunity for local and tribal governments to review and update individual address information in the MAF and associated geographic information in the TIGER data base to improve the completeness and accuracy of both computer files.

MAF (Master Address File) A computer file based on a combination of the addresses in the 1990 ACF and current versions of the DSF, supplemented by address information provided by state, local, and tribal governments. The MAF is being updated throughout the decade to provide a basis

for producing address labels needed to deliver Census 2000 questionnaires, keep track of which forms have been returned and which need followup, serve as the sampling frame for the Census Bureau's periodic demographic surveys, and support other Census Bureau statistical programs.

MCD (Minor Civil Division) A primary and/or administrative subdivision of a county, such as a township, precinct, or magisterial district.

MO/MB (Mailout/mailback) A method of data collection in which the USPS delivers addressed questionnaires to residents who are asked to complete and mail back the questionnaire to the appropriate Census Bureau office.

NRFU (Nonresponse Followup) A census followup operation in which temporary field staff, known as enumerators, visit addresses from which no questionnaire was returned by mail, from which a telephone response was not received, or for which no administrative records could be located.

OCR (Optical Character Recognition) Machine identification of printed characters through the use of light sensing devices.

OMR (Optical Mark Recognition) Technology that uses an optical scanner and computer software to scan a page, recognize the presence of marks in predesignated areas,

and assign a value to the mark depending on its specific location on a page.

PAMS/ ADAMS (Preappointment Management System/ Automated Decennial Administrative Management System) An integrated structure of administrative management programs that supports applicant track ing andprocessing, background checks, selection records, recruiting reports, personnel and payroll processing, and archiving of historical data.

P.L. 94-171 (Public Law 94-171) The public law that requires the Census Bureau to provide selected decennial census data tabulations to the states by April 1 of the year following the census enumeration. These tabulations are used by the states to redefine the areas included in each Congressional district and in other districts used for state and local elections, a process called redistricting.

P.L. 103-430 (Public Law 103-430) The public law that amends Title 13, United States Code, to allow designated local and tribal officials access to the address information in the MAF to verify its accuracy and completeness. This law also requires the USPS to provide address information it compiles to the Census Bureau to improve the MAF.

PUMS (Public Use Microdata Sample) Computerized files containing a small sample of individual long-form census records showing the population and housing characteristics of the people included on those forms.

QA (Quality Assurance) A systematic approach to build quality into a process.

QC (Quality Check) A coverage measurement methodology (also called the Integrated Coverage Measurement Survey) that will be used to determine the number of people and housing units missed or counted more than once in Census 2000. This information is combined with the enumeration results before producing a single set of official census results (the one-number census estimates).

RCC (Regional Census Center) One of 12 temporary Census Bureau offices established to manage LCO activities and to conduct geographic programs and support operations such as automated map production. The Census Bureau also will open an "Area Office" to manage census operations in Puerto Rico.

RO (Regional Office) One of 12 permanent Census Bureau offices established in 12 cities throughout the country to implement outreach and promotion activities during the census period and to conduct survey enumeration and other decentralized work of the Census Bureau.

SBE (Service-based Enumeration) An operation designed to enumerate people at places where they might receive services,

such as shelters, soup kitchens, and other selected locations. This operation targets the types of services that primarily serve people who have no usual residence.

SP (Special Place) A residence where people live or stay other than the usual house, apartment, or mobile home. Examples are colleges and universities, boarding and rooming houses, marinas, nursing homes, hospitals, and prisons.

STF (Summary Tape File) A series of census summary tabulations of complete count and sample population and housing data available for public use on computer tape and CD-ROM.

TIGER®* (Topologically Integrated Geographic Encoding and Referencing) A computer data base that contains a digital representation of all census-required map features (streets, roads, rivers, railroads, lakes, and so forth), the related attributes for each, and the geographic identification codes for all entities used by the Census Bureau to tabulate data for the United States, Puerto Rico, and Island Areas. The TIGER data base records the interrelationships among these features, attributes, and geographic codes and provides a resource for the production of maps, entity headers for tabulations, and automated assignment of addresses to a geographic location in a process known as "geocoding."

T-NIGHT (Transient Night) An enumeration procedure conducted to enumerate people occupying campgrounds at racetracks, recreational vehicle (RV) campgrounds or RV parks, commercial or public campgrounds, fairs and carnivals, and marinas.

TQA (Telephone Questionnaire Assistance) A toll-free service that will be provided by a commercial phone center to answer questions about Census 2000 or the census questionnaire.

U/L (Update/leave) A method of data collection in which enumerators personally deliver a census questionnaire to a household to be completed and returned by mail

and at the same time update the address list.

USPS (United States Postal Service) The organization responsible for delivering the mail questionnaires in Census 2000, and the producer of the DSF.

WAN (Wide Area Network) A group of computers linked within a network, such as the Census Bureau's regional offices, to exchange and share information. Whereas a "local area network" may link computers within a building or among several buildings, a WAN covers more area and distance.

*TIGER® is a registered trademark of the U.S. Bureau of the Census. For ease of presentation, the trademark symbols for TIGER and TIGER-related products are omitted from the text.

APPENDIX B. KEY CENSUS BUREAU TELEPHONE CONTACTS

Headquarters

Program Area	***Contact Person***	***Telephone Number***
Marketing	*Solomona Aoelua*	301-457-2988
Partnerships	*Brenda August*	301-457-1646
Content Determination	*Louisa Miller*	301-457-2073
Forms, Printing and Mailing	*James Marsden*	301-457-4010
Address List Development	*Linda Franz*	301-457-1014
Geographic *Services*	*Robert LaMacchia*	301-457-1022
Office *Infrastructure*	*Mark Taylor*	301-457-1827
Automated Collection	*Howard Prouse*	301-457-1933
Personal Visit	Charles Moore	301-457-2051
Special Populations	Annetta Clark-Smith	301-457-2378
Telephone Questionnaire Assistance/ Internet	*Barbara LoPresti*	301-457-2839
Data Capture	*Alan Berlinger*	301-457-1737
Data Processing	*Maureen Lynch*	301-457-4092
Statistical Design	*Howard Hogan*	301-457-4242
Quality Check *Operations*	*David Whitford*	301-457-4035

Dissemination and Products	*Jane Ingold*	301-457-4646
Evaluation	*Florence Abramson*	301-457-4222
Research/ Experimentation	*Deborah Bolton*	301-457-3944
2010 Census Planning	*Jay Keller*	301-457-4040
Puerto Rico/ Island Areas	*Lourdes Flaim*	301-457-4041

General

Customer Service	301-457-4100
Census Locator	301-457-1713
Census Bureau Website	www.census.gov/

Census Bureau Regional Offices

(Information Services, Data Product Information)

Atlanta, GA	404-730-3833/3964 (TDD)
Boston, MA	671-424-0510/0566 (TDD)
Charlotte, NC	704-344-6144/6548 (TDD)
Chicago, IL	708-562-1740/1791 (TDD)
Dallas, TX	214-640-4470/4434 (TDD)
Denver, CO	303-969-7750/6769 (TDD)
Detroit, MI	313-259-1875/5169 (TDD)
Kansas City, KS	913-551-6711/5839 (TDD)
Los Angeles, CA	818-904-6339/6249 (TDD)
New York, NY	212-264-4730/3863 (TDD)
Philadelphia, PA	215-597-9313/8864 (TDD)
Seattle, WA	206-728-5314/531 (TDD)
Regional Office Liaison at Headquarters	301-457-2032

APPENDIX C. ADDITIONAL INFORMATION CONCERNINGTHE CENSUS 2000 DRESS REHEARSAL

1. Contrasts Between the Three Dress Rehearsal Sites

2. Census 2000 Decision Memorandum No. 36, "Key Features of the Census 2000 Dress Rehearsal with Aspects of a Nonsampling Methodology in the South Carolina Site."

April 1998

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

CASE No. 1:98CV00456-RCL

UNITED STATES HOUSE OF REPRESENTATIVES, PLAINTIFF

v.

THE UNITED STATES DEPARTMENT OF COMMERCE, ET AL. DEFENDANTS AND CITY OF LOS ANGELES, ET AL., PROPOSED INTERVENOR-DEFENDANTS

THREE JUDGE COURT

DECLARATION OF MARGO J. ANDERSON

Margo Anderson declares:

1. I am a Professor of History and Urban Studies at the University of Wisconsin-Milwaukee, where I have taught since 1977. I was the Chair of the History Department from 1992-95. I graduated *summa cum laude* with a B.A. in History from Bucknell University in 1967, and received my M.A. and Ph.D in History from Rutgers University in 1972 and 1978, respectively.

2. My primary fields of scholarship are the social history of the United States Census and the history of statistics. I am the author of *The American Census: A Social History* (New Haven: Yale University Press, 1988) and the co-author with Stephen Fienberg of the forthcoming *Who Counts? The Politics of Census Controversies* (New York, Russell Sage). I have published over twenty major articles on these and related topics.

3. I am currently the Chair of the Social Statistics Section of the American Statistical Association. I was a member of the Panel on Census Requirements in the Year 2000 and Beyond, Committee on National Statistics. The Report of the Panel was published as *Modernizing the U.S. Census* (Barry Edmonston and Charles Schultze, eds. (National Academy Press, 1995).

4. Plaintiffs incorrectly suggest that the Census Bureau's plan to use statistical sampling represents an unprecedented departure from an established practice of taking the census. *See, e.g.*, Plaintiffs' Statement of Undisputed Material Facts No. 4, Memorandum for Plaintiff U.S. House of Representatives In Support of its Motion for Summary Judgment, 1 ("Memo."). Plaintiffs' memorandum shows a basic lack of

understanding of the history of censustaking. *See, e.g.*, Memo. at 1. Rather the history shows that over the past 200 years, census taking methods have changed as advancements in technology and statistical science have evolved. All of the innovations in methods of censustaking for the past 200 years have aimed at a more accurate count. The goal with each change in method was to improve the accuracy and efficiency of the census.

5. The decision to use limited sampling to adjust for the undercount in Census 2000 is a natural progression in a process that has been going on for as long as the United States has been conducting the census. Problems with accuracy are identified and studied, and changes are implemented to address those problems and improve accuracy. The Framers could not have intended to prohibit statistical sampling because statistical sampling was unknown at the time. Likewise just as the Framers did not anticipate rail, auto, or air travel, or electrical forms of power, they did not anticipate such innovations as the mail census and TIGER (Topologically Integrated Geographic Encoding and Referencing System), machine tabulation, or computerization in census- taking. Nor did "statistical sampling" as a probability method exist in the 18th century. Thomas Jefferson's "estimate" was not a probability estimate, because probability estimates were themselves inventions of the 19th and 20th century. Jefferson's estimates were based upon common sense methods of extrapolation or interpolation, which might have been very good, but they were not numbers arrived at through probability sampling.

6. The history of censustaking in the United States can be conceptualized in four major periods. From the first to the sixth censuses (1790-1840), the State Department oversaw a household level enumeration taken by assistants to the United States marshals. The results were tallied in the field, and compiled into national results by a clerical staff in Washington of about a dozen people. From 1850 to 1900, Congress mandated a temporary Census Office in the Interior Department that oversaw the tabulation of an individual level census. The volume of data collected, tabulated, and reported expanded dramatically, as the decennial census became one of the federal government's largest undertakings. Federal officials introduced machine tabulation of the data in 1890. After the turn of the century, the census professionalized and entered its third phase. In 1902, Congress created a permanent Census Bureau in the Department of Commerce and Labor (later the Commerce Department), and the Census Bureau began to take on additional responsibility for periodic surveys and statistical functions beyond the decennial count. In the fourth phase, since 1940, the Census Bureau integrated emerging statistical theory, probability methods and computerization into a variety of survey operations, including the decennial census, which now characterize modern statistical practice.

7. Contrary to plaintiffs' assertions, from the first census of 1790 to the present, particularly in the early years, the census was never a "physical headcount" of each individual person. Nor was an "actual inquiry at every dwelling house" the sole instruction given to assistant marshals or enumerators. *See* Memo. at 8, 10. Rather the assistant marshal or enumerator was told to

get the best information about the household from the household head of the family. He was supposed to contact the household head or reference person to gather the data on the whole family. The ideal method was a visit to each dwelling house, but Congress always acknowledged in statutory language that such a visit might be impossible. Thus the language of the 1810 Census Act, for example, gave the assistant marshals some leeway: The enumerator was to make "an actual inquiry at every dwelling house, or of the head of every family within his district." In other words, the assistant had the authority to get the information without a visit to the dwelling.

8. Congress undertook a major overhaul of the census law for the 1850 census. Although plaintiffs would have the court believe otherwise, the census did not attempt to identify each individual by name and personal characteristics until then. Prior to 1850, only the name of the household head was written down on the form; everyone else in the household was numbered. Beginning with the 1850 census, the unit of analysis was no longer the household, but the individual. Margo J. Anderson, *The American Census: A Social History* 39, 40 (1988). A group of scholars and statisticians recognized that a change in existing procedures was needed because the results of the 1840 census revealed substantial error. They attributed the inaccuracy to the unwieldy 80-column schedule and decentralized tabulation procedures that were used in the 1840 census. *See id.* at 29-37. For the previous three decades Congress had been expanding the demands for information they made on the census. The errors they discovered in the 1840 count revealed that they could not collect such information accurately with

the census machinery they had at the time. Hence, they affirmed their commitment to collecting more accurate and detailed information about the population by dramatically increasing the census bureaucratic structure, moving to an individual level count, and committing themselves to publish many volumes of census results.

9. Concerns about the accuracy of the census and census methodologies are a constant refrain in the history of the census. For example, Francis Walker, who was the Census Director for the 1870 and 1880 censuses, wrote in the 1890s about the 1890 census: "No matter how well the work in general may have been done, bad spots can always be detected, here and there, by searching scrutiny. . . . There are rural communities in which it would be inexcusable for a census-taker to omit a single person among five hundred or a thousand. There are other communities in which it would no more be possible for a census-taker to secure the name of every resident than it would be for an accomplished angler to catch the last trout in a stream." 2 Francis A. Walker, *Discussions in Economics and Statistics* 115 (Davis Dewey, ed. 1970). Walker himself made major efforts in increasing census accuracy, including shortening the enumeration period from months to two weeks in cities and populous areas, setting up a Geography Division in the Census Office to systematically map the country, and developing examinations for hiring census enumerators. But he could not do more than make educated guesses about how much error existed in the count, because probability models did not exist at the time.

10. The Census Bureau became a permanent federal agency in 1902, located in the new Department of Commerce and Labor. Congress recognized that taking the census required special expertise. The 1900 Census law authorized the appointment of an Assistant Director, "who shall be an experienced practical statistician," and five chief statisticians, "who shall be persons of known and tried experience in statistical work." Margo J. Anderson & Stephen E. Fienberg, *Who Counts? The Politics of Census Taking in Contemporary America* 16 (forthcoming). As the field of statistics grew, and the professional statistical community expanded, natural links developed between professional statisticians and the Bureau. An Advisory Committee to the Census Bureau was formed in 1919. Advising the Bureau on policy, questionnaire design, and other aspects of statistical innovation, the Advisory Committee became a tangible link between the Census Bureau and the growing professional statistical community. This trend toward statistical innovation at the Bureau was reflected in the major changes of the 1940 Census.

11. By the 1930s, statistical sampling techniques had begun to be perfected and applied to problems of censustaking. Jerzy Neyman's famous 1938 article, "Contributions to the Theory of Sampling Human Populations," (Anderson at 185), for example, informed the 1940 census design and led to major changes in the 1940 census. The 1940 census included additional questions on a sample of the population for the first time, a housing census and evaluation studies to systematically measure the level of accuracy of the enumeration, the tabulation and coding procedures,

coding bias and sampling error. Anderson & Fienberg at 21.

12. It was part of the general trend in statistical innovation at the Bureau that statisticians began their systematic estimates of census undercount. The undercount was first identified in 1940, and in the 1950s demographers and the Census Bureau began to use a technique called "demographic analysis" to ascertain the extent of the undercount. This technique involved comparing information from earlier censuses and other population data with the aggregate population counts for particular cohorts of the population. Anderson & Fienberg at 23. Demographic analysis, however, had its limits. As an aggregate methodology, it cannot pinpoint exactly why the undercount (or overcount) exists; it cannot provide more specific information about the sources of the undercount. In order to overcome this limitation of demographic analysis, the Census Bureau developed new techniques, particularly the post enumeration survey (PES), which was first used after the 1950 census in an effort to identify inaccuracies in the original count. *Id.* By the 1960s, there was a growing body of knowledge about the census undercounts. Professional statisticians and experts at the Census Bureau began to discuss the best methods for estimating the undercount, and for improving the accuracy of the count in the first place. In 1969, the National Academy of Sciences created the "Advisory Committee on Problems of Census Enumeration" to assist the Bureau in, among other things, researching and recommending methods to reduce or eliminate the undercount. *Id.* at 30.

13. The 1950s and 60s saw more technical improvements in censustaking. The professional standards of the Census Bureau improved greatly as it hired and developed a new generation of sampling statisticians, survey researchers, and technicians. Anderson & Fienberg at 27. In 1950, the Census Bureau first used a computer to tabulate results, making it a pioneer in the government in the use of data processing. Anderson at 197. In 1960, the Bureau used "Film Optical Sensing Device for Input to Computers"—a scanner—to read answers on the census form electronically. A major change in census methodology occurred in 1970 with the first mail census. The Bureau decided to use a mail census for about 60% of the country—mainly urban areas—in order to improve overall coverage of the population. Anderson at 211.

14. By the early 1970s, Bureau officials knew a great deal about the differential undercount. But they did not know whether it would be possible to correct for it, because demographic analysis, the best method for measuring undercount at that point, did not permit estimation of undercount at low levels of geography. For much of the 1970s and 1980s, census officials, two National Academy panels and professional statisticians worked on this problem. In 1987, Bureau statisticians announced that they had solved the problem of measuring the undercount at the local level and proposed the use of a 300,000 household PES as part of the 1990 census design. There was still a good deal of controversy about the new methodology, to the point that in October 1987 Commerce officials overruled the Bureau and cancelled the expanded PES. In late 1988, New York City and a coalition of states and local communities sued for the reintroduction of the PES. In

July 1989, the parties entered into a stipulation agreement to conduct a 150,000 household PES and consider de novo its use for adjusting the April 1990 count.

15. Hence, claims by Bureau officials that there was no statistically defensible method of adjustment in 1980 are true, but plaintiffs's use of such claims is unavailing and irrelevant, since the government conceded in 1989 that there could be an adjusted 1990 count if the PES was successful. *See* Memo. at 14.

16. The House's Memorandum is replete with other inaccuracies. The following list is just a sample:

a. Plaintiffs contend that "[Thomas] Jefferson was familiar with methods of statistical estimation, having used them effectively in his 1782 survey of Virginia's population." Memo. at 12. However, "methods of statistical estimation" did not exist in the 18th century. The 18th century "estimate" was not a probability estimate; probability estimates were not invented until the late 19th century. An "estimate" for Jefferson was a "guess"— which could be a good one, but it did not mean a number arrived at through probability sampling.

b. Similarly, plaintiffs mischaracterize history when they contend that "The Framers understood that the population could be determined through either statistical estimation or a headcount because the colonies had used both procedures in the past." Memo. at 27. Again, since statistical estimation did not exist in the 18th century, the colonies could not have used this procedure; thus the Framers could not

have been making the choice that plaintiffs argue they made.

c. Plaintiffs contend that "a *number* of well-known experts have disagreed sharply" with the National Academy of Sciences' conclusion that "statistical sampling would increase the accuracy and lower the costs of the census." Memo. at 16. They cite, by way of example, articles by David Freedman and Kenneth Wachter. But these experts are not in fact representative of professional opinion, which is best expressed by the organizational resolutions of the professional associations. For example, the American Statistical Association, which has more than 19,000 members nationwide, has endorsed the use of sampling in Census 2000. The American Sociological Association, a professional group of more than 12,500 sociologists, research scientists, and others interested in sociology, unanimously approved a resolution supporting the use of sampling in Census 2000.

17. In sum, the historical record tells a very different story from that told by plaintiffs. It reveals 200 years of efforts—and highly successful ones at that—to increase the accuracy and efficiency of the decennial count. Much of the impetus for the organizational and statistical innovation came from dissatisfaction with the quality of the results of the previous census. Thus, the dissatisfaction with the 1840 count led to the expansion and reform of censustaking in 1850. The dissatisfaction with the capacity of a temporary agency to further professionalize and improve the quality and accuracy of the count led in the late nineteenth century to pressure for the permanent

Census Bureau. The demands for data for the expanded functions of the federal government in the early twentieth century led the Bureau to introduce probability methods to improve the quality, quantity, and timeliness of its statistical results. The goal of all of these innovations is precisely so that the apportionment of Congress "according to their respective Numbers" can be based upon numbers that Americans can count on.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct.

Executed on this 2 day of May, 1998.

/s/ MARGO J. ANDERSON
MARGO J. ANDERSON

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

CASE No. 1:98CV00456-RCL

UNITED STATES HOUSE OF REPRESENTATIVES, PLAINTIFF

v.

THE UNITED STATES DEPARTMENT OF COMMERCE, ET AL. DEFENDANTS AND CITY OF LOS ANGELES, ET AL., PROPOSED INTERVENOR-DEFENDANTS

THREE JUDGE COURT

DECLARATION OF STEPHEN ELLIOTT FIENBERG

I, Stephen Elliott Fienberg declare:

Qualifications

1. I am a Maurice Falk University Professor of Statistics and Social Science at Carnegie Mellon University, a position I have held since 1997. I was also Head of the Department of Statistics from 1981-1984, Dean of the College of Humanities and Social Sciences from 1987-1991, and Maurice Falk Professor of Statistics and Social Science from 1985-1991 and 1992-1997. At York University in North York, Ontario, Canada, I was Professor of Statistics and Law from 1991-1993 and Vice President of Academic Affairs from 1991-1993. I previously held several positions at the University of Minnesota's Department of Applied Statistics, School of Statistics, including Acting Director for the Statistical Center, Chairman of the Department of Applied Statistics, and Professor.

2. I am a Fellow of several professional societies, including the American Association for the Advancement of Science, the American Statistical Association, the Institute of Mathematical Statistics, and the Royal Statistical Society. I have served as Vice President of the American Statistical Association, President of the International Society for Bayesian Analysis and am currently President-Elect of the Institute of Mathematical Statistics. I have also held numerous professional and government-related consulting positions in statistics, including such a consulting position with the U.S. Bureau of the Census ("Bureau") from 1979-1980 and 1982-83.

3. I have written extensively on the subject of statistical methods and their application. I have authored 14 books and over 200 papers on this subject.

My major works addressing statistical sampling and adjustment methodologies in the context of the census include:

- *Who Counts? The Politics of Census Taking in Contemporary America* (New York, Russell Sage), forthcoming, which I co-authored with Margo Anderson of the University of Wisconsin-Milwaukee;

- *Who Counts: The Politics of Censustaking.* Society (Transaction), 34, (No. 3 March/ April 1997), 19-26 (with M. Anderson);

- *Bibliography on capture-recapture modelling with application to census undercount adjustment.* Survey Methodology 18 (1992), Vol 15, 779-821;

- *The New York City census adjustment trial: Witness for the plaintiffs.* Jurimetrics, 34 (Fall 1993), 65-83;

- *Ethical and modelling considerations in correcting the results of the 1990 decennial census.* Ethics in Modeling (W.A. Wallace, ed.), (1994), Pergamon, 103-144;

- *Multiple sample estimation of population and census undercount in the presence of matching errors (with discussion)* Proceeding of the Bureau of the Census Tenth Annual Research Conference (1994) (with Ye Ding). A revised version appeared in Survey Methodology, 22, (1996), 55-64;

- *An adjusted census in 1990* (in nine parts),

(a) *An adjusted census in 1990*, Chance, 2 (*No. 3*), (1989), 23- 25 (with M. Anderson);

(b) *An interim report*, Chance, 3 (No. 1), (1990) 19-21;

(c) *Back to court again*, Chance, 3 (No. 2), (1990) 32-35;

(d) *The judge rules and the PES begins*, Chance, 3 (No. 3), (1990) 33-36;

(e) *Commerce says no*, Chance, 4 (No. 3) (1991), 44-52;

(f) *A full scale judicial review approaches*, Chance, 4 (No. 4) (1991) 22-24, 29;

(g) *The trial*, Chance, 5 (No. 3-4), (1992) 28-38;

(h) *Trial and judgment set aside*, Chance, 7, (1994), 31-32;

(i) *The Supreme Court decides*, Chance, 9, (No. 2) (1996), 4-9 (with M. Anderson);

• *A three-sample multiple-recapture approach to census population estimation with heterogeneous catchability*. J. Amer. Statist. Assoc., 88 (1993), 1173-1148 (with J.N. Darroch, G.F.V. Glonek and B. Junker).

4. In 1992, at the trial of *City of New York v. Department of Commerce*, an earlier case concerning the use of statistical methodologies in the 1990 Census, I testified on behalf of the State of New York concerning the: (1) history of dual system estimation (discussed below), (2) the use of the dual system estimation

method by the Bureau in the context of the decennial census from 1950 through 1980, (3) my work on the Committee on National Statistics at the National Academy of Science on decennial census methodology, and (4) the errors, biases and misrepresentations used to support the Secretary of Commerce's decision not to adjust the 1990 Census total for undercount.

5. My opinions expressed herein are based upon my professional knowledge and experience, my review of relevant scientific literature, my review of the Bureau's reports concerning the censuses for 1980, 1990 and 2000, and my review of various pleadings on file in this action and in other similar litigation.

Challenges to the 2000 Census

6. The daunting task of attempting to count each and every one of the more than 250 million Americans can be illustrated by a much simpler task—trying to count the number of persons at a local high school basketball game during halftime. During halftime, spectators come and go—some leave, some get refreshments, some switch seats, and the players and coaches go to the locker rooms. Some spectators may be counted twice (those who change seats), and even more might be missed (those who were not in their seats when that area of the gym was being counted). Now, consider attempting this task for the dynamic, shifting, ever mobile population of the entire United States. It should not be surprising to learn that planning for the decennial census often begins at least a decade prior to the enumeration, costs billions of dollars, and even then is subject to substantial error.

7. In conducting every census, the Bureau must contend with numerous sources of error, including, but

not limited to: (1) missed households, (2) persons who refuse to participate, (3) conflicting definitions of "housing units" and "families," (4) different dates of enumeration for different phases of census operations, (5) the completion of the census questionnaire by one person who provides erroneous information for the entire household, (6) confusion about the questionnaire's instructions and wording, (7) persons inadvertently checking the wrong box on the questionnaire form, (8) the failure of enumerators to complete the questionnaire or recording information different than that given by those in the household, (9) the submission of multiple questionnaires by a single household, (10) coding and processing errors, (11) fabrication, (12) enumerators obtaining information from mailmen, neighbors or building managers as "a last resort" before turning in their questionnaires, and (13) difficulty counting special groups (for example, parolees and probationers).

8. A little more than fifty years ago, the Bureau realized the presence of a particularly disturbing problem which is a complex combination of many of these sources of error, called "differential net undercounting." Simply put, the members of different subpopulations are missed at different rates. As detailed by Daniel O. Price in his article on the subject, the draft in World War II demonstrated that the 1940 Census underreported about 3% of men between the ages of 21 and 35. Daniel O. Price. *A Check on Underenumeration in the 1940 Census* (American Sociological Review, 12:44-49, Feb. 1947). Price also found that the degree of the undercount varied by region and race. He demonstrated that approximately 13% of the black men of draft age were missed in the census. The following

table shows the estimated net census undercount rates from 1940 to 1990 as measured by demographic analysis, a method I describe in more detail below:

Year	Black	White	Difference	Overall Undercount
1940	10.3%	5.1%	5.2%	5.6%
1950	9.6%	3.8%	5.8%	4.4%
1960	8.3%	2.7%	5.6%	3.3%
1970	8.0%	2.2%	5.8%	2.9%
1980	5.9%	0.7%	5.2%	1.4%
*1990	7.4%	1.0%	6.4%	1.9%

* Preliminary Calculation using same methodology as in 1980.

1990 Revised Estimates**				
1940	8.4%	5.0%	3.4%	5.4%
1950	7.5%	3.8%	3.8%	4.1%
1960	6.6%	2.7%	3.9%	3.1%
1970	6.5%	2.2%	4.3%	2.7%
1980	4.5%	0.8%	3.7%	1.2%
1990	5.7%	1.3%	4.4%	1.8%

Robert E. Fay et al. *The Coverage of the Population in the 1980 Census, Bureau of the Census.* (U.S. Department of Commerce, Washington, D.C. 1988); U.S. Bureau of the Census. *Statistical Abstract of the United States, 1996.* (Government Printing Office, Washington, D.C. 1996). What is especially disconcerting about these data is that the differential net undercount in the 1990 Census was greater than that in the 1980 Census, despite the Bureau's redoubled efforts to enumerate the entire population using a host of special coverage completion methods.

9. Extensive research conducted near the census-taking period in 1990 suggested some of the characteristics of those persons who were undercounted, including:

- persons residing in complex housing arrangements (e.g., containing more than one family);

** Revised to reflect 1990 change in methodology in the classification of mixed race births. (Source: [FPRC88] and [otC91]

- people residing in informal housing arrangements (e.g., rented attics, basements, garages, trailers and illegal units);
- obile persons; and
- persons fearing the government and census takers.

Overview of the 2000 Census

10. The 2000 Census will consist of three phases, including: (1) a basic mail out/mail back enumeration process combined with a series of special enumeration approaches for different segments of the population—this is an attempt at a complete enumeration, (2) a non-response follow-up ("NRFU") of those households which did not return their questionnaires after repeated mailings, visits or calls, and (3) an integrated coverage measurement ("ICM") technique for correcting the data from the first two phases.

11. The 2000 Census mailing campaign has a number of new features representing an improvement over prior censuses. Unlike the 1990 Census, the 2000 Census will utilize a recently developed master address file ("MAF"), which is a combination of the 1990 Census address list and the current national Postal Service list. Prior to the enumeration, census takers will canvass every block to double check the accuracy of the addresses. The 2000 Census also uses a new marketing strategy to boost the return rate. In contrast to the single questionnaire used in the 1990 Census, the 2000 Census will use multiple mailings; it will have two mail contacts with questionnaires, each of which will be preceded with a reminder. In addition to the mailings

the questionnaires will also be delivered and picked up by hand. There will be special methods employed for non-traditional households. In addition to the mail out/mail back component, other mechanisms will be available for the distribution of and completion of the census questionnaire, and those alternatives will be widely publicized. Questionnaires in different languages will be made available in public places, such as libraries and post offices. Bureau of the Census. *Report to Congress-The Plan for Census 2000.* (Government Printing Office: August 1998).

Statistical Methodologies and the 2000 Census

(1) The NRFU

12. The Achilles' heel of the 1990 Census was the Bureau's effort to send out enumerators to get responses from every household that did not respond to initial attempts to reach them. Special programs designed to reach all of those who were missed produced data of questionable quality. The further from the April 1 Census Day that data was collected, the more data quality declined and errors increased. Eugene P. Ericksen and Theresa K. DeFonso. *Beyond the Net Undercount: How to Measure Census Error.* Chance, 6(4): 38-43, 1993. This process was also difficult, time-consuming, and expensive.

13. The 2000 Census enumeration component will rely mainly on mail return of census questionnaires, as has every census since 1970. The mail response rate, however, has fallen from 78% in 1970 to 65% in 1990. As a result, the Bureau hired and trained more than 500,000 interviewers to go door-to-door. For the 2000 Census, the Bureau expects the return rate to decline even further to 55%, but believes that it can raise the

response rate to 67% by using a second mailing. Despite the effort that is planned the enumeration process is expected to leave 34 million occupied households that do not respond. Bureau of the Census. *Report to Congress-The Plan for Census 2000.* (Government Printing Office: August 1998).

14. To illustrate how the NRFU works, let us consider a hypothetical census tract of 15 blocks with approximately 4,000 people in 1,500 housing units. Conventional enumeration methods (i.e., the mail campaign telephone calls, etc.) might result in 1,005 (or 67%) responding households. Under the proposed NRFU, the Bureau will ensure direct contact with *at least* 90% of the units in each tract. The Bureau would then randomly select 345 of the 495 non-responding units for visits and interviews. Responses for the 150 (10%) remaining housing units would be estimated using sample interview data from the sample of 345 housing units. *Report to Congress-The Plan for Census 2000.* (Government Printing Office: August 1998).

15. The 2000 Census NRFU is designed to rectify the inaccuracies, wasted time, and sky rocketing costs produced by the 1990 Census follow-up by circumventing the costly, unproductive, and statistically questionable census completion programs. By contacting a sample of the non-responding households, the Bureau will save significant money, which can be used to hire better enumerators who will obtain more reliable data, resulting in greater accuracy in the total enumeration. Thus, NRFU will also reduce the time span over which the follow-up is conducted, reducing errors caused by a dynamic U.S. population.

(2) The ICM

(a) Explanation of Dual System Estimation (DSE) Methodology

16. Inaccuracy in the census largely stems from 4 problems, two of these relate to omissions and two to erroneous enumerations. First, some housing units are never counted because they are missing from the MAF or inaccurate information leads them to be classified as unoccupied. Improvements in the quality of the MAF will reduce the number of missed housing units. A second and much equally large source of inaccuracy comes from missing people in households that do supply some information but omit individuals, or households for which information is incompletely given by others. The ICM not only helps fill in gaps in the address list, it represents an effective way to address the second problem. Finally, households and people occasionally submit duplicate questionnaires or are erroneously counted in the wrong locations. The ICM helps address these problems of erroneous enumeration as well. This is why a series of National Academy of Science panels over two decades recommended inclusion of an ICM-like adjustment in the plans for the decennial census.

17. The ICM will employ dual system estimation ("DSE") methodology to estimate the undercount in the 2000 Census. In contrast to the use of sampling in the NRFU, which is designed to produce higher quality estimates for non-responding households, the sampling for the ICM is designed to "correct" the results of the initial attempt to enumerate the population through the mailing campaign and the NRFU. It is a separate and

independent count of members of households in a very large nationwide sample of blocks.

18. DSE is an old procedure, used since the late 1800's, and is widely accepted among statisticians. It is most commonly used in estimating the size of wildlife populations, where it is known as the "capture-recapture" technique. DSE is based upon well- known counting methodologies and is well documented in statistical literature. Stephen Fienberg. *Ethical and Modeling Considerations in Correcting the Results of the 1990 Census.* Ethics in Modelling (W.A. Wallace, ed.), (1994), Pergamon, 103-144; *Bibliography on capture-recapture modelling with application to census undercount adjustment,* Survey Methodology, 18 (1992), 143-154. A standard statistical encylopedia article on statistical estimation uses capture-recapture methods at its opeing example. D.L. Burkholder. *Estimation: Point Estimation,* in W.H. Kruskal and J.M. Tanur, eds. International Encylopedia on Statistics (New York: The Free Press) (1978), pp. 251-259.

19. We can explain the DSE method using a simple example. Consider a marine biologist wishing to estimate the number of fish in a lake. The biologist can accomplish this by twice attempting to catch and count each fish in the lake. In order to keep track of which fish are counted the first time, the biologist marks each fish before releasing it. As the fish are caught the second time, the biologist can use the marks to determine whether each fish was counted in the first attempt. He can use information from both counts to derive a more accurate assessment of the size of the fish population than that resulting from only one of the two counts.

20. More specifically, suppose the biologist counts 200 fish the first time and 150 fish the second time. Suppose further that of the 150 fish counted the second time, 125 bore marks indicating that they had been among the 200 fish counted the first time. Thus, there are three classes of fish that have been counted -fish caught both the first time and second time (125), fish caught the first time but not the second time (75), and fish caught the second time but not the first time (25). The total number of fish in the three classes is 225, all of which have been directly observed by the biologist. Note that this number exceeds the number of fish observed in either of the two counts. The examination of the random sample—the second count —shows that 125 out of 150 fish, or 5/6 of the sample, had been captured in the first count. Generalizing from the sample, we can conclude that 5/6 of the total fish population in the lake was captured in the first count. We can thus estimate that the *total* fish population is 200 x 6/5=240.

21. Like the method used by the biologist in the example above, the DSE methodology in Census 2000 will involve a second round of counting the population. The first round includes the traditional counting techniques including the basic enumeration as well as the NRFU. The second round is the post-enumeration survey (PES). In the PES, the Bureau will select a nationwide probability sample of 25,000 blocks (or approximately 750,000 housing units). This sample is physically independent of data from the activities associated with the enumeration and the NRFU. In fact, the sample will actually be selected before the mailing occurs. Relying on well-trained enumerators, the Bureau will attempt to enumerate households in the

sample blocks and list every person residing there. For each of the 25,000 sample blocks, the Bureau will compare the first count with the independent second count, determining which households and household members were included erroneously or represent duplicates. Then the Bureau will attempt to match housing units and persons. The result is a simple set of improved counts for the sample of 25,000 blocks. The results for the sample are then applied to every block in the nation.

22. The use of DSE in the 2000 Census has been several years in the making and is an implementation of the recommendations from the two panels from the National Research Council's Committee on National Statistics. B. Edmonston and C. Schultze, eds., *Modernizing the U.S. Census*, Panel on Census Requirements in the Year 2000 and Beyond, Committee on National Statistics, National Research Council (National Academy Press, 1995); D. Steffey and N. Bradburn, eds., *Counting People in the Information Age*, Panel to Evaluate Alternative Census Methods, Committee on National Statistics, National Research Council (National Academy Press, 1994). It is founded on the basically successful PES in 1990 and then improved upon as a result of the research the Bureau has done since 1990. In particular, it reflects the results of the research leading up to and including the results of the 1995 test census.

23. The DSE methodology has been employed in the past two censuses to evaluate census quality. The methodology has undergone substantial review and improvement by the Bureau, with special and extensive input from panels at the National Academy of Sciences,

and by experts in statistical methodology from across the country. ICM methodology is generally accepted as the most reliable method to improve census results. Bureau of the Census. *Report to Congress-the Plan for Census 2000.* (Government Printing Office: August 1998).

(b) Evolution of Methodologies for Determining Undercount Leading to DSE

24. After it realized the extent of the differential undercount following the 1940 Census, the Bureau embarked on vigorous efforts to measure the undercount. It carried out a series of coverage evaluation projects aimed at measuring undercounts, overounts, and erroneous enumerations using a variety of techniques. Demographic analysis emerged early on as the primary tool for evaluating coverage at the national level. Demographic analysis uses data on births, deaths, immigration and emigration to determine the number of persons residing nationally.

25. While helpful for estimating the net undercount at a national level, demographic analysis has serious shortcomings, chief among them being that it is subject to significant uncertainty due to the difficulty in determining its components, especially emigration and net illegal immigration. U.S. Bureau of the Census. *Conference on Census Undercount.* (Government Printing Office, Washington D.C., 1980). Demographic analysis is also unable to pinpoint exactly why the undercount (or overcount) or where it occurs. As an aggregate methodology, it cannot identify which particular individuals were missed, nor can it provide more specific information on the sources of undercount.

26. To overcome the disadvantages of demographic analysis, the Bureau developed new techniques, particularly the Post Enumeration Survey (PES). Following the 1950 Census, the Bureau attempted a sample reenumeration of to the country to try to identify households missed by the enumerators, household members who were not reported within households, as well as other classification and categorization errors in the original enumeration. The Bureau then matched the information from the sample survey to the original census forms and developed estimates of the quality of the original count. The PES revealed that in 1950, as in the 1940 Census, there was an undercount and poorer coverage of non-whites.

27. The PES also uncovered only 40% of the "net underenumeration" expected from demographic analysis. The Bureau later explained that the PES was very successful in finding places that the original census enumerator had missed but was much less effective in uncovering missed persons. Leon Pritzker and N.D. Rothwell. *Procedural difficulties in taking past censuses in predominantly negro, puerto rican, and mexican areas.* In David Heer, editor, *Social Statistics and the City*, pages 55-79. (Joint Center for Urban Studies of M.I.T. and Harvard University, Cambridge, CA 1968).

28. By the time the Bureau started planning for the 1980 Census, Bureau officials and their critics had come to realize that while it might be possible to improve the actual enumeration, it would probably not be possible to eliminate the differential undercount through traditional means of enumeration, either by a mail or a house-to-house count. S. E. Fienberg and M. Anderson.

Who Counts? The Politics of Census Taking in Contemporary America (New York, Russell Sage, forthcoming) at 36. As a result, a serious discussion about the possibility of developing an accurate "adjustment" or "correction" ensued.

29. The 1980 Census arrived, however, before any consensus had emerged on the proper method for adjustment. Consequently, the Bureau adopted a stopgap method for measuring the undercount, referred to as the post-enumeration program (PEP). The PEP attempted to match the April and August Current Population Survey (CPS) respondents to the April census enumeration. The CPS is a survey conducted every month by the Bureau to produce the national unemployment rate.

30. The PEP avoided some of the problems of demographic analysis because it did not require the estimation of demographic patterns (for example, illegal immigration), that affected demographic analysis. The PEP, however, suffered from positive "correlation bias," meaning that being missed in the census was positively correlated with being missed in the second list. The result was an underestimation of the actual population size but an improvement over the unadjusted value. Howard Hogan and Kirk M. Wolter. *Measuring accuracy in a post-enumeration survey.* Survey Methodology, 14:99-116, 1988. It also suffered from the fact that the data gathered from the August CPS were obtained months after the April PEP, resulting in further error.

31. In the 1980 PEP, the Bureau took a sample of 110,000 households from the census, selected in clusters of approximately 10 housing units per enumeration

district, and matched it to the households in the April and August CPS, each containing approximately 84,000 households. The Bureau produced estimated undercounts for the U.S. as a whole, as well as for all 50 states and several large local areas. S. E. Fienberg and M. Anderson. *Who Counts? The Politics of Census Taking in Contemporary America* (New York, Russell Sage, forthcoming) at 58.

31. In 1990, the Bureau revised its PES methodology in order to better estimate the differential undercount. Instead of relying upon a survey designed for an entirely different purpose, (the CPS), it designed a new PES directly linked to census geography. The Bureau implemented this approach in a 1986 test of adjustment-related operations in Los Angeles.

32 A major difference between the 1990 Census and the 2000 Census is in the sample size of the ICM. The 1990 Census PES gathered survey information from the inhabitants of approximately 5,000 blocks across the nation. The final design for the 1990 PES involved checking on the occupants of 165,000 households nationwide. By contrast, the 2000 Census ICM will select 25,000 blocks and ultimately obtain information from the occupants of 750,000 housing units. This 5-fold increase in sample size is expected to produce far greater accuracy in the ICM, and to allow for a new approach to estimating a correction for every block on a state by state basis. Bureau of the Census. *Report to Congress-The Plan for Census 2000.* (Government Printing Office: August 1998).

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(c) Selecting the ICM Sample

34. Undercount rates differ for different kinds of blocks. One would not expect the DSE estimate of the net undercount rate for a block in the heart of Washington, D.C. to tell us very much about the net undercount in Langley, Virginia. Accordingly, in selecting the ICM sample, the Bureau starts with a list of all the blocks or equivalent-size rural units in the United States, then groups blocks into categories (or "strata") according to both geography and their demographic characteristics. Such characteristics might include racial composition, proportion of homeowners to renters, and average household size. Rates of undercount for each stratum are determined by measuring the undercount of a sample of blocks within the stratum by DSE. The undercount rate of these blocks is then applied to the other blocks in that stratum. The final ICM step to complete the census enumeration consists of correcting the raw census count for each stratum to take into account estimated omissions and erroneous enumerations in that stratum.

35. There is a key difference between the strata used in the 1990 Census PES and the strata planned for the 2000 Census. In the 1990 Census PES, the strata *crossed* state lines. In the 2000 Census ICM, separate strata will be established *within* each state. The use of customized strata for each state is expected to produce greater accuracy. *Bureau of the Census Report to Congress-The Plan for Census 2000* (Government Printing Office: August 1998).

Expected Error Rate in the 2000 Census Without Sampling

36. As we discussed previously, errors in the census can arise from many sources. Errors are grouped into two basic types—those that occurred during the measuring or data collection process (non-sampling error) and errors that occur because only part of the population is being directly contacted (sampling). Non-sampling error and its consequent biases are present throughout the census process and can reduce the quality of results *far more* than sampling errors. The most harmful type of non-sampling error is coverage error, which arises from two general problems—missing entire housing units, and missing some or all of the people in an enumerated unit. Based on the 1990 results, 69.5% of the coverage errors came from enumerated housing units, and the remaining 30.5% came from housing units that were not enumerated at all. Bureau of the Census. *Report to Congress-The Plan for Census 2000.* (Government Printing Office: August 1998) at 41.

37. There are three types of coverage error—omissions, duplicates, and erroneous inclusions. Omissions occur when housing units or people are missed. Duplicates occur when housing units or people are included more than once. Erroneous inclusions occur when people are incorrectly included in the initial enumeration because they are fictitious, in the wrong location, etc.

38. These three types of coverage error can be combined to produce either a figure for *net* error or *gross* error numbers. "Gross error" refers to the *total* number of errors made in the census, while "net error" refers to the combined effect of these errors on the resulting statistics. For gross error, the effect is additive-the sum of people omitted plus duplicates plus erroneous inclusions. For net error, the errors are treated as an excess (duplicates and erroneous inclusions) or a deficit (omission), depending on the type of error, and the effect of combining produces a canceling-out effect. Gross error measures the total number of mistakes in the census—net error measures the net undercount and, as we will explain, this can be a misleading measure of the quality of the census count.

39. The 1990 Census had a net undercount of approximately 4 million people. Bureau of the Census. *Report to Congress-the Plan for Census 2000.* (Government Printing Office: August 1998). The gross error was more than 26 million people: 15 million people who were not counted at all (or were not counted in the correct block) and 11 million people who were incorrectly included in a block. The net number of people not included in the national total represents the 4 million national net undercount. Bureau of the Census. *Report to Congress-the Plan for Census 2000.* (Government Printing Office: August 1998). Those who say that the 1990 Census was the most accurate census error are mistaken. They are talking about net national error. Even if the net national undercount were zero, this would tell us nothing about how omissions and erroneous enumerations are distributed over all blocks in the nation.

40. The Bureau has estimated that the net error under its proposed plan will be 1.1% at the census tract level, 0.6% at the congressional district level, 0.5% at

the state level, and 0.1% at the national level. The projected net error from a physical enumeration with no sampling in 2000 **would average 1.9% at all levels** from the census tract level to the national level:

	National	States	Congressional Districts	Census Tracts***
The Census 2000 Plan	.01%	0.5% (0.2% - 05%)	0.6% (0.3% - 2.3%)	1.1% (0.6% - 2.4%)
Improved procedures without any sampling	1.9%	1.9% (0.4% - 3.2%)	1.9% (-1.2% - 7.0%)	1.9% (-1.2% - 6.2%)

Bureau of the Census. *Report to Congress-The Plan for Census 2000.* (Government Printing Office: August 1998) at 44.

Plaintiff's Criticism of the 2000 Census Plan is Unfounded

41. Plaintiff contends that the Bureau has "adopted a program for conducting the 2000 Census that abandons any attempt to locate all persons who can be

*** The range of error at the census tract level has been "trimmed" so that it does not include the most extreme outlier—the highest and lowest 3 percent.

found and count them" and will "instead . . . estimate the population using statistical methods commonly referred to as 'samplings.'" (Memorandum at 1). This statement is false. As we explained above, the Bureau begins with an attempt at a full enumeration and only then makes limited use of sampling to: (1) estimate responses for a large fraction of the households which did not return their mail questionnaires, were not contacted by telephone, or were not counted through other traditional means, and (2) achieve an accurate assessment of those persons who were missed by the original enumeration. Thus, plaintiff's claim that the Bureau proposes to "estimate the population" by statistical methodologies is flat wrong.

42. Plaintiff erroneously states that Thomas Jefferson "was familiar with methods of statistical estimation, having used them effectively in his 1782 survey of Virginia's population . . . "(Memorandum at 12). Jefferson could not have used statistical estimation because it was still being developed. Perhaps the earliest known attempt to do statistical estimation was by Pierre Simon LaPlace in 1783, who used a form of ratio estimation to produce a statistical estimate of the population of France. Laplace P.S. (1786). *Sur les naissances, les marriages et les morts a Paris depuis 1771 jusqu'en 1784; et dans toute l'entendue de la France, pendant les annees 1781 et 1782.* Mem. Acad. Sci. (1783), pp. 693-702. It was many years before LaPlace's idea would lead to the development of a theory of statistical estimation and 160 years before it would be used again in a census context. Jefferson could not have used probability sampling methods because these methods were not developed for another 120-130 years. For example, see the discussion on the

use of probability sampling in S.E. Fienberg and J.M. Tanur, *A historical perspective on the institutional basis for survey research in the United States*, Survey Methodology, 16 (1990) 31-50; S.E. Fienberg and J.M. Tanur, *Recondsidering Neyman on experimentation and sampling: Controversies and fundamental contributions*, Probability and Mathematical Statistics, 15 (1995) 47-60. Jefferson was simply making on educated guess based on the information he had.

43. Plaintiff's claim that "a number of well-known experts have "disagreed sharply" with the Academy's recommendation that statistical sampling would increase the accuracy and lower the costs of the 2000 Census (Memorandum at 16) is purposely vague. To my knowledge, there are only a handful statisticians who are on record as opposing the use of statistical sampling and estimation methodologies in 2000 Census, including the two statisticians relied upon by plaintiff (Freedman and Wachter). (Memorandum at 16-17).

44. Plaintiff states that "the Government Accounting Office (GAO) has concluded that sampling for nonresponse follow-up will be less accurate that complete enumerations." (Memorandum at 19). By definition, a "complete enumeration" will produce 100% accuracy. The problem is that it is not possible for the Bureau to obtain a "complete enumeration." Experience tells us that the Bureau cannot come close to achieving this goal. In all censuses in the last several decades, the Bureau's attempts to reach those missed failed and induced additional error into the census counts. Further, plaintiff has totally distorted the GAO's position on statistical sampling. Contrary to plaintiff's assertion, the GAO *never said* that sampling for nonresponse

follow-up was "less accurate" than enumeration. What the GAO *did say* is the combination of the enumeration and the ICM might produce superior results, but that it lacked the data to make any judgment on this issue.

> In our July 1997 report, we noted that sampling for follow-up could reduce cost and save time, while the ICM could improve the accuracy of the population totals.

45. Plaintiffs argue that, with respect to the ICM, "[T]he blocks picked for the sample will not be random" (Memorandum at 20), implying that the ICM will be inaccurate. Plaintiff's statement is incorrect. The sample is a randomly selected, stratified sampling of blocks: "'The Census Bureau plans to classify each of the country's 7 million blocks into categories known as strata and will select blocks at random from each stratum for a total of 25,000 blocks." Bureau of the Census. *Report to Congress-The Plan for Census 2000.* (Government Printing Office: August 1998).

46. Plaintiff's statement that the post-strata are based on the Bureau's "subjective assumptions" about how various racial and ethnic groups will respond to the census is false. While there is no single definition of the design of such groupings, two decades of research have demonstrated that creating such groupings is better than none at all.

47. Plaintiff alleges that "many have questioned the operational feasibility" of the ICM, including the GAO (Memorandum at 22), citing GAO Report to the COMM on Governmental Affairs, U.S. Senate, 2000 Census: Preparations for Dress Rehearsal Leave Many Unanswered Questions (GAO/GGB-98-74) (March

1998). That report supports the use of statistical sampling and the ICM. In that report, the GAO expressed its concern with the enumeration component of the proposed plan, including the Bureau's ability to hire qualified enumerators and interviewers. The use of statistical sampling methodologies in Census 2000 will help to minimize this problem. Also, plaintiff's use of the term "many" is deliberately misleading.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct.

Executed on this 4th day of May, 1998.

/s/ STEPHEN E. FIENBERG
STEPHEN E. FIENBERG

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

CASE No. 1:98CV00456-RCL

UNITED STATES HOUSE OF REPRESENTATIVES, PLAINTIFF

v.

THE UNITED STATES DEPARTMENT OF COMMERCE, ET AL. DEFENDANTS AND CITY OF LOS ANGELES, ET AL., PROPOSED INTERVENOR-DEFENDANTS

THREE JUDGE COURT

DECLARATION OF JACK N. RAKOVE

Jack Rakove declares:

1. I am the Coe Professor of History and American Studies at Stanford University, where I have taught since 1980, and where I also hold appointments as Professor (by courtesy) of Political Science and (beginning next year) of Law. Since 1997, I have also been a Visiting Professor of Law at New York University School of Law. I was educated at Haverford College, where I earned an A.B. with honors in History in 1968; the University of Edinburgh, Scotland, where I studied in 1966-67; and Harvard University, where I earned a Ph.D. in History in 1975. My principal field of scholarship is the political history of the American Revolutionary era, and my scholarly writings have been largely concerned with the process of the creation of a national government under both the Articles of Confederation and the Constitution. I have also written a number of scholarly articles concerned with the political thought and career of James Madison, usually recognized as the leading framer and original interpreter of the Constitution. Since 1983, I have also been interested in demonstrating what historians can contribute to the ongoing debate over the theory of "originalism" in constitutional interpretation. My major works include the following:

[a] *The Beginnings of National Politics: An Interpretive History of the Continental Congress* (New York: Knopf, 1979), which surveys both the political history of the Continental Congress to 1787 and the process of drafting, ratifying, and attempting to amend the Articles of Confederation.

[b] *James Madison and the Creation of the American Republic* (Glenview, Ill.: Scott Forsman, 1990)

[c] ed., *Interpreting the Constitution: The Debate over Original Intent* (Boston: Northeastern University Press, 1990), a reader of leading essays on the problems that originalism poses for both constitutional law and theory and historical inquiry

[d] *Original Meanings: Politics and Ideas in the Making of the Constitution* (New York: Knopf, 1996), which examines both the history of the adoption of the Constitution and the problems and challenges that efforts to make sense of the extant documentary record pose for both the proponents and critics of originalism. *Original Meanings* is the recipient of three book prizes: the Pulitzer Prize for History (1997), the Fraunces Tavern Museum Book Award (1997), and the Book Prize of the Order of the Cincinnati (1998); (the latter two prizes are awarded within the field of American Revolutionary history).

[e] *Declaring Rights: A Brief History with Documents* (Boston: Bedford, 1997).

2. The general constitutional question raised in the pending census litigation is partially addressed in chapter IV of *Original Meanings*, especially at pp. 70-74. That chapter is primarily concerned with the two sets of compromises over issues of representation that dominated the first seven weeks of debate at the Constitutional Convention of 1787. The first set of issues concerned the dispute between "small" and "large" states, which culminated in the decision of July

16, 1787 giving each state an equal vote in the Senate. The second set of issues, which is far more pertinent to this litigation, concerned the initial allocation and future reapportionment of seats in the House of Representatives. This dispute was essentially settled in the days immediately preceding the "Great Compromise" of July 16, with the acceptance of the principle that representation in the House and direct taxation (for example, poll taxes) would both be allocated among the states on the basis of population, with slaves being counted at the ratio of three to five (the so-called three-fifths clause). Here the lines of conflict followed largely sectional lines that divided the delegates into blocs of northern and southern states. Because northern states would hold the initial majority in both houses of the new Congress, southern delegates had a strong incentive to secure a constitutional mandate for future reapportionment, especially since it was then believed that future population growth and migration into the interior of the continent would work to the advantage of their region. Southern delegates at the Constitutional Convention also sought to receive credit for their enslaved population, on two distinct grounds. First, slaves contributed significantly to the national economy, and thus to the revenues on which the new government would rely. Second, some southern delegates, reacting to the emergence of antislavery sentiment in the northern states, conceded that this additional political credit would help protect the institution on which their society rested. Discussion of the census was driven primarily by these concerns, and southern delegates—most notably Governor Edmund Randolph of Virginia—took the lead in insisting that rules for periodic reapportionment on the basis of a census should be locked into the text of the

Constitution, not left to the discretion of future Congresses, which might permit the northern states to preserve their initial majority. In these discussions, however, consideration of *how* census data would be gathered was always a distinctly secondary concern. A careful reading of the relevant debates clearly indicates that the delegates were nearly always discussing the actual rule of reapportionment, not the method of conducting the census.

3. It was on the basis of having examined the politics of the reapportionment question in *Original Meanings* that I submitted to the *Washington Post* an essay challenging the idea that the Constitution creates a barrier to the use of modern statistical sampling procedures to supplement the traditional methods of household-by-household collection of population data. That article was published in the Outlook section of the *Post* on March 15, 1998 (page C2), under the title "Counting on Madison in the Census Dispute." I have subsequently reviewed the brief filed in this litigation, as well as reviewed extant records of debate relevant to this question.

4. The standard source upon which scholars rely to understand the debates at the Constitutional Convention is Max Farrand, ed., *The Records of the Federal Convention of 1787*, first published by Yale University Press in 1911, and then republished in 1937, 1966, and 1987. Concurrently with the last republication, the same press issued James H. Hutson, ed., *Supplement to Max Farrand's The Records of the Federal Convention of 1787* (1987), which contains both documents included in the fourth supplemental volume of the original series as well as other sources discovered since. To recover how the Constitution was understood by the American

public in general and its ratifiers in particular, historians now rely on the materials gathered in John P. Kaminski and Gaspare J. Saladino, eds., *The Documentary History of the Ratification of the Constitution* (Madison: State Historical Society of Wisconsin, 1976-), which is still in process (13 volumes have appeared to date). Eventually this series will completely supersede the standard nineteenth-century source, Jonathan Elliot, ed., *The Debates in the Several State Conventions, on the Adoption of the Federal Constitution.* Other useful compilations of sources for the ratification debates include the seven volumes of Herbert Storing, ed., *The Complete Anti-Federalist* (Chicago: University of Chicago Press, 1987), and the recent two-volume set edited by Bernard Bailyn, *The Debate on the Constitution* (New York: Library of America, 1993). There are numerous editions of *The Federalist*, the celebrated defense of the Constitution written largely by James Madison and Alexander Hamilton.

5. The constitutional objections to the use of sampling procedures for the purpose of reapportioning the allocation of seats in the House of Representatives (and, by extension, each state's vote in the Electoral College) largely depend on the presence of the term "actual Enumeration" in the sentence mandating that the first census be taken within three years of the first meeting of the new Congress under the Constitution and every ten years thereafter, "in such Manner as they [Congress] shall by Law direct." Plaintiffs contend that "actual Enumeration" excludes any form of estimating that Congress might otherwise adopt under the final phrase of this sentence. In support of this claim, their brief cites various statements made by the delegates at

Philadelphia, and other sources (notably *Federalist* 54), to suggest that the framers were primarily concerned with avoiding the political manipulation of reapportionment that would occur if Congress could juggle the mode of collecting census data at its discretion. In the plaintiffs' account, a concern with authorizing one and one mode only of gathering data outweighed any substantive concern with the ultimate accuracy of the count. But the "*permanent & precise standard*" that delegates such as George Mason (quoted here) sought was to be determined by establishing a constitutional rule of reapportionment itself, not by specifying a mode of collecting data. What was at issue throughout this controversy, and what the delegates were explicitly addressing, were fundamental principles of representation itself. Was it legitimate or not to count slaves for purposes of representation, even though they could never be regarded as citizens in any sense of the term? Could the Union itself last if equitable rules for reapportionment were not explicitly incorporated in the text of the Constitution, to assure Americans that they would not sacrifice or dilute their political rights by migrating westward? If representation was to be based on both persons and property—as the link to direct taxation and the inclusion of slaves suggested—was not a simple population count the most accurate and convenient index of wealth? These were the true questions that the delegates addressed in early July 1787—not the secondary matter of exactly how census data was to be compiled. That subject was in fact never debated per se; it was discussed only within the context of asking whether a population count provided the most convenient method of estimating wealth.

6. To evaluate the plaintiffs' claim on historical grounds requires at least two things: an effort to trace the evolution of the relevant provisions of Article I, Sect. 2, Clause 3, through the course of the Convention; and a close attention to the context in which particular statements were made. Applying these two standard rules of historical analysis supports a different conclusion than the one reached in the plaintiffs' memorandum. Both the framers and ratifiers of the Constitution understood that the crucial provisions relating to reapportionment were those requiring that it occur at regular intervals on the basis of a census, and that the formula for reapportionment be set constitutionally, in the form of the population rule specified in the first sentence of this Section. On closer (that is, contextual) examination, the contemporary statements that plaintiffs cite in support of the framers' commitment to a particular mode of data-gathering turn out to refer instead to the crucial and divisive question of whether or not slaves should be counted for purposes of representation. In fact, almost nothing of substance was said about the question of how the data was to be collected.

7. The discussion of the census issue took place chiefly during the period July 5-12. Prior to this point, the Convention had recently deadlocked over the question of applying some rule of proportional representation to the upper house (July 2; Farrand, ed., 1 *Records* at 510), and a committee of one member from each state had just reported a "compromise" to preserve the equal-vote rule of the unicameral Continental Congress in the new Senate (July 5; Farrand, ed., 1 *Records* at 526). Almost a month earlier, however, the committee of the whole had approved a

motion to apportion representatives in the lower house according "to the whole number of white & other free Citizens & inhabitants of every age sex & condition including those bound to servitude for a term of years and three fifths of all other persons not comprehended in the foregoing description, excepting Indians not paying taxes, in each State." (June 11; Farrand, ed., 1 *Records* at 201). Glossing this motion, its author, James Wilson (Pa.) noted that it would "requir[e] a census only every 5-7, or 10 years" (ibid.). One alternative the Convention had just discussed— to proportion representation to each state's contributions to the national treasury—might presumably introduce more variance from one session to the next, with the ebb and flow of trade and tax revenues, producing greater inequity if representation was not reapportioned more frequently. The rule proposed by Wilson was also endorsed in the July 5 report of the compromise committee on the deadlock over the Senate. That report also recommended that each state receive one representative for every 40,000 inhabitants, including slaves calculated according to the three-fifths rule (Farrand, ed., 1 *Records* at 526).

8. The Convention returned to the issue of apportionment in the House of Representatives in early July. On July 5 and 6, the Convention debated whether the rule of apportionment should be based on population solely, or whether representation should not be tied to property or wealth as well. On July 6 the Convention appointed a five-member committee to consider the part of the compromise committee's report relating to apportionment in the House. (Farrand, ed., 1 *Records* at 542). This committee in turn reported on July 9, proposing an initial allocation of 56 House seats

among the thirteen states. When pressed to explain the basis on which they had allocated seats, committee members conceded that they had tried to combine population and wealth in some unspecified way. Equally important, they recommended that future Congresses be authorized "to augment the number of representatives" for the existing states and "to regulate the number of Representatives" in cases where states were either divided or united, or newly created, "upon the principles of their wealth and number of inhabitants." The comments recorded by James Madison on this part of the report indicate that the delegates were concerned with the question of whether or not wealth should count for purposes of representation, whether slaves should be counted at all (William Paterson), and whether the timing of reapportionment should be left to the discretion of Congress (Edmund Randolph). Discussion ended with a decision to recommit this part of the report to a new committee of one delegate from each state. (Farrand, ed., 1 *Records* at 559-62). That committee reported the next day, July 10, recommending enlarging the size of the first House to 65 members. Discussion of this report indicated a measure of sectional mistrust (Farrand, ed., 1 *Records* at 566-70).

9. After the Convention approved this initial allocation on July 10, Governor Edmund Randolph of Virginia moved "that in order to ascertain the alterations in the population & wealth of the several States the Legislature should be required to cause a census, and estimate to be taken within one year after its first meeting; and every years thereafter—and that the Legis[latu]re arrange the Representation accordingly." (Farrand, ed., 1 *Records* at 57-71). On the

next day, Randolph accepted a substitute resolution from Hugh Williamson of North Carolina, which stated "that in order to ascertain the alterations that may happen in the population & wealth of the several States, a census shall be taken of the free white inhabitants and 3/5ths of those other descriptions on the 1st year <after this Government shall have been adopted> and every year thereafter; and that the Representation be regulated accordingly." This proposal was again modified by Randolph on July 12, but in its various forms the Randolph-Williamson resolution provided the occasion for the framers' one sustained discussion of the census.

10. The notes of this debate kept by James Madison do not support the conclusion that the framers' chief concern was to assure one mode of collecting the information required for reapportionment. It is important to note that the phrase "actual Enumeration" had not yet been introduced in any resolution or used in debate—nor would it appear in the records of deliberation for another two months. More important, both the context of this debate and the substance of the remarks indicate that the true concern was to determine a substantive rule for reapportionment, and that this concern in turn branched into several distinct but complementary questions:

a. Was wealth in one form or another a legitimate criterion or factor to be taken into account in the apportionment of representation?

b. Should a slave population overwhelmingly concentrated in the states from Maryland south be counted for purposes of representation?

c. Should a rule for reapportionment even be included in the Constitution at all, or was it not in the interest of the existing seaboard states to allow Congress to use its own discretion to decide whether, when, and how to reapportion, in order to preserve a monopoly of power for the original states against a foreseeable movement of population into the trans-Appalachian interior?

11. The last of these questions (10c) was the catalyst that drove discussions of (a) and (b), and this in turn reflected the provocative role assumed in this debate by Gouverneur Morris of Pennsylvania, who was a member of the two committees proposing the initial allocations of seats in the House. Morris candidly urged the Convention to coalesce in denying the future interior states the prospect of gaining control of the national legislature, and he accordingly resisted inserting any fixed rule for reapportionment into the prospective Constitution (see his speeches of July 10 and 11, Farrand, ed., 1 *Records* at 571, 581-82, 583-84). But his position in turn alarmed such southern delegates as Randolph (who also served on the two committees), George Mason, and Madison, just as Morris's opposition to explicitly recognizing slavery as a basis for representation irked the South Carolina delegates, who wanted to count slaves as equal to free inhabitants. Southern delegates resisted Morris's appeal for several reasons. First, like other Americans in the 1780s, they assumed (wrongly) that population movement westward would work to the regional advantage of the South, enlarging the "agricultural" interest that their region already possessed (as opposed to the "commercial" interest of the North). Second, they expected that the movement of migration in a

southwestern arc toward New Orleans would also mark an extension of the southern plantation economy. Third, as the initial minority in the nation, but also thinking that their population would later move into parity with the North's, they had an incentive to lock a rule of apportionment (the 3/5 provision) into the Constitution, and to mandate gathering the information on which reapportionment would occur. To leave these questions to the discretion of future Congresses was a formula for preserving the permanent minority status of the South.

12. In discussing whether representation was about population (or citizenship) alone, or some combination of population and wealth, the framers clearly understood the difficulty of gathering reliable estimates of the latter. Other than measuring contributions to the national treasury, there was no obvious way that this data could be reliably gathered, nor (then as now) could one easily or exactly say what form this measurement should take. Even using treasury contributions as a formula could be unjust, because most delegates assumed that the new government would rely on duties on foreign imports for the bulk of its revenues, and these would be most easily collected at ports of entry, which were hardly evenly distributed among the states even in 1787. Yet because, for political reasons, the delegates became committed to giving the slaveholding states some representational credit for their peculiar form of wealth in human beings, the framers never repudiated the idea that property was in some sense a legitimate criterion of representation. (Women, children, and indentured workers could all be regarded as citizens even if they lacked the suffrage; but slaves were legally regarded as property only, devoid of any

rights or attributes of citizenship). The framers thus adopted the fiction that population, though not a perfect way of estimating wealth, was the most convenient and accurate means of doing so available. If it was legitimate to represent slaves as a form of property—which is clearly what the Constitution originally did—their "actual Enumeration" in the census was itself, ironically, a form of estimating wealth.

13. As the comments of various speakers on July 11-12, 1787, make clear, the framers manifestly understood that the true dispute over the census was closely connected with calculations of sectional advantage, which quickly and repeatedly devolved into the question of whether or not slaves were to be counted, and if so, at what ratio. The southern insistence on an initial census and recurring censuses at fixed intervals was predicated on the assumption of future population growth working to their regional advantage, as comments by Randolph and Mason demonstrate (Farrand, ed., 1 *Records* at 578-79, 579-80, 586, 594). Given Morris's aversion (occasionally echoed by other delegates, such as Roger Sherman of Connecticut) to any constitutionally mandated census or rule of reapportionment, the key points to be established were that a census had to occur and recur, and that the rule of allocating seats could not be left to the discretion of a northern-dominated Congress. Questions about the mode of gathering data were never explicitly addressed as such, with the sole exception being Randolph's early comment that "The census must be taken under the direction of the General Legislature. The States will be too much interested to take an impartial one themselves." (Farrand, ed., 1 *Records* at 580.)

14. After the debates of July 10-11, the census issue never again became a subject of active debate, but its evolution can be traced discretely. In late July, the Convention recessed while a Committee of Detail converted the resolutions adopted thus far into a working draft of the Constitution. As the census provisions came to the committee, the new Congress could still be said to have some discretionary authority to decide whether or not reapportionment should occur. The operative language stated that it "shall be authorised from Time to Time to apportion the number of Representatives" for the original states, and that it "shall possess Authority to regulate the Number of Representatives" in cases of states dividing, uniting, or being created, though in all these cases it would have to follow the basic population rule laid down (Farrand, ed., 2 *Records* at 130-31). In its report of August 6, however, the committee of detail recommended tightening this language significantly, so that the operative language now said that "the Legislature shall, in each of these cases, regulate the number of representatives by the number of inhabitants, according to the provisions herein after made" (Farrand, ed., 2 *Records* at 178, and cf. 182, where the population rule now appears in a separate clause that omits any explicit reference to representation. Given that many of the framers were morally embarrassed about their concession to slavery, the committee may have broken up this clause in order to obscure the relation between slavery and representation. The connection was clarified on August 8; ibid. 219.)

15. Until literally one week before the adjournment of the Convention, the key term at dispute in this litigation ("actual Enumeration") had as yet not been

heard. The resolutions reported to the Committee of Style appointed to prepare the final, polished draft of the Constitution still provided that representation in the House and direct taxation "shall be regulated by the whole number of free citizens and inhabitants, of every age, sex, and condition, including those bound to servitude for a term of years, and three fifths of all other persons not comprehended in the foregoing description, (except Indians not paying taxes) which number shall, within three years after the first meeting of the Legislature, and within the term of every ten years afterwards, be taken in such manner as the said Legislature shall direct" (Farrand, ed., 2 *Records* at 571). When the committee reported its draft to the Convention on September 12 (five days before adjournment), the clause had been revised to its almost final form, and the second sentence now read "The actual enumeration shall be made within three years after the first meeting of the Congress of the United States, and within every subsequent term of ten years, in such manner as they shall by law direct." (Farrand, ed., 2 *Records* at 590-91.)

16. While it is plausible to infer that the insertion of this term did tighten the language of Article I, Section 2, the extant sources do not enable us to speak with any great confidence about how the delegates understood the import of this change. When this provision came up for debate on September 13, the framers devoted their brief comments to two other points. They substituted "service" for "servitude" in the passage relating to indentured servants, the word *servitude* "being thought to express the condition of slaves"; and they rejected a motion to eliminate the reference to "direct taxation" in a clause otherwise concerned with representation,

because as Gouverneur Morris, with his usual candor, reminded them, the reference to taxation served as a fig leaf to legitimate the counting of slaves for purposes of representation. (Farrand, ed., 2 *Records* at 607-8.) The adoption of the phrase "actual Enumeration" escaped comment; its meaning and import went undiscussed. The sentence in which it was embedded was still concerned primarily with the question of the frequency with which a census would occur, and its concluding clause still gave Congress discretion to determine how the census would be conducted.

17. A further reference to the census as an enumeration can be found in Article I, section 9. The report of the Committee of Style included a provision stating that "No capitation tax shall be laid, unless in proportion to the census herein before directed to be taken." In the final round of textual corrections that took place during the last few days of the Convention, this clause was modified in two ways:

(a) at the motion of George Read of Delaware, the phrase "or other direct tax" was inserted after "capitation";

(b) and of more interest, and in the exact language of Madison's notes, "On motion of Col: [George] Mason, 'or enumeration' inserted after, as explanatory of 'census'". (Farrand, ed., 2 *Records* at 596, 618; and for further documentation, see Hutson, ed., *Supplement*, 269.)

Two delegations (Connecticut and South Carolina) opposed this change, but Madison recorded no debate on it. At this point in the Convention, many delegates were anxious to conciliate Mason, who had already

indicated that he was unlikely to sign the completed Constitution.

18. One conclusion seems certain: neither in July nor September did the framers discuss what an enumeration would entail in administrative terms. Nor did they have occasion to consider whether advances in statistical sampling procedures (which did not even exist at the time, in the strict sense of the term) would be constitutionally impermissible if empirical evidence existed to suggest that household-by-household enumeration was defective.

19. Plaintiffs' brief makes only occasional reference to contemporary sources other than the *Records of the Federal Convention*, and with good reason, because the census itself was not a important subject of discussion during the ensuing public debate over ratification. As is often the case with the ratification materials, the most rewarding source is *The Federalist*. The most salient essay, *Federalist 54* (written by Madison), which is cited in plaintiffs' brief, is from start to finish a defense (albeit a not unambivalent one) of the three-fifths clause of the Constitution, confirming that it was the rule for the apportionment of representation and direct taxation, not the mode of gathering the requisite population data, that Madison deemed controversial and thus requiring defense. Moreover, in the concluding paragraph of this essay, Madison implied that the actual taking of the census might yet devolve upon the states, noting the possibility that if the census were to be used solely for representation or for taxation, states would have an incentive either "to swell or reduce the amount of their numbers" respectively. The factor that will promote "the accuracy of the census," Madison suggested, will be the balancing force the dual factors of

representation and taxation will exert—not the language requiring an "actual Enumeration."

20. In summary, the preponderance of the extant documentary evidence from the constitutional debates of 1787-88 supports the conclusion that the preeminent issue was whether the Constitution should contain an explicit rule for reapportioning the House of Representatives (and by extension, the Electoral College). A census was necessary to provide the information on which reapportionment would take place, and the concern of the initial minority region (the southern states) that they and the new states in the interior receive both just treatment and the political advantages they expected to gain dictated that the census and reapportionment occur at fixed intervals. Little of substance was said, however, about the means whereby the necessary information would be collected. The key phrase "actual Enumeration" was introduced in the text of the Constitution only during the Convention's final week, through the editorial labors of the Committee of Style, and no discussion of its meaning and import was recorded.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct.

Executed on this 29th day of April, 1998.

/s/ JACK N. RAKOVE
JACK N. RAKOVE

UNITED STATES DEPARTMENT OF COMMERCE
Bureau of the Census
Washington, DC 20233-0001

[Stamped "Jan 02, 1998"]

CENSUS 2000 DECISION MEMORANDUM NO. 34

MEMORANDUM FOR John H. Thompson
Associate Director for
Decennial Census

From: Ruth Ann Killion /s/ RAK
Chief, Decennial Statistical
Studies Division

Subject: Decision to Increase Nonresponse Followup Sampling Rates for High Response Tracts

The Plan for Census 2000 as it relates to sampling for nonresponse followup (NRFU) has been changed. The Census Bureau's modified plan, announced in March, 1997, included Direct Sampling for NRFU. This decision changes Direct Sampling to improve equity among tracts.

Direct Sampling, as detailed in the March, 1997, Plan for Census 2000, includes sample sizes equal to the number of nonrespondent addresses needed to raise each tract completion rate[1] to 90 percent, or equal to 10 percent of the remaining nonrespondents, whichever is

[1] DSSD 1998 Dress Rehearsal Memorandum Series E-3 and DSSD Census 2000 Memorandum Series R-5 from Killiion to Thompson, "Response and Completion Rates for the 1998 Dress Rehearsal and Census 2000."

larger. Thus tracts with high response rates will have significantly lower sampling rates than other rates, as shown below:

Initial Response Rate	Sampling Rate Under Old Plan
60%	3-in-4
70%	2-in-3
80%	1-in-2
85%	1-in-3
90%	1-in-10

These lower sampling rates translate to higher sampling errors. A simulation conducted by the National Research Council[2] demonstrates this relationship:

Initial Response Rate	Coefficient of Variation (%)
60%	.63
70%	.67
80%	.77
90%	1.64

This modification of Direct Sampling will remedy the inequitable treatment of high response tracts. A number of alternatives were researched by analyzing the effect of different sampling rates on statistical accuracy and field workloads. Direct Sampling will continue to sample at the rate required to raise each tract completion rate to 90 percent. However, for tracts with an

[2] National Research Council, Committee on National Statistics, "Preparing for the 2000 Census: Interim Report II," June, 1997.

initial response rate of at least 85 percent, the sampling rate will be 1-in-3. This modification is summarized below:

Initial Response Rate	Sampling Rate Under New Plan
IRR_85%	Large enough to get to 90%
85%<IRR	1-in-3

In simulations conducted with 1990 Census operational data, this change had a positive effect on sampling errors, with a minor effect on budget and workloads. A simulation using 1990 Census operational data produced coefficients of variation (CV's) with the following distributions under the old and new Direct Sampling plans[3]:

	Minimum	Weighted Mean	Maximum
Old Plan	0%	1.1%	97.9%
New Plan	0%	1.1%	46.2%

Using the simulation method of the National Research Council, the sampling errors for high response tracts are significantly reduced, as shown below:

[3] CV's in this table include variation due to sampling for Integrated Coverage Measurement as well as NRFU sampling. Also, CV's are presented in terms of estimated population in the year 2000.

Initial Response Rate	Old Plan CV	New Plan CV
85%	.95	.95
90%	1.64	.77
95%	1.16	.55

Increased sampling for high response tracts does increase costs, but not enough to prevent acceptance of the modification. In the operational data simulation, only about 17% of all tracts are affected by the modification. And since those tracts had high mail response, they generally had few nonrespondent units, meaning the workload increases are not significant. Overall, the national NRFU sample rises from 22.18 million units to 22.47 million units, a difference of 290 thousand.[4] In the 10,077 tracts affected by the increased NRFU sampling rate, the sample size increases from 492,582 units to 781,054 units. The estimated total cost increases approximately $10 million.

Our goal is to ensure equity of the NRFU sampling. Given the fact that increased sampling rates for certain tracts addresses this concern with little effect on cost, we have decided to change the plan for Census 2000 to include higher sampling rates for high response tracts.

I concur with the recommended revision to the nonresponse followup sampling rate.

[4] All housing unit figures in this section are in terms of estimated Census 2000 housing units. Workload figures do not include followup of undeliverable-as-addressed vacant housing units.

/s/ PRESTON JAYWAITE 1/2/98
JOHN H. THOMPSON Date
Associate Director for
Decennial Census

cc: Distribution List

DECLARATION OF LEOBARDO F. ESTRADA

I, Leobardo F. Estrada, hereby declare as follows:

1. I currently hold a position as Associate Professor of Urban Planning at the School of Public Policy and Social Research, University of California, Los Angeles. I have been at U.C.L.A. since 1977. Prior to that, I held academic positions at the University of North Texas, University of Texas at El Paso, and Institute for Social Research at the University of Michigan at Ann Arbor. I received my B.A. degree from Baylor University in 1966, and my M.S. and Ph.D degrees from Florida State University in 1968 and 1970. Attached hereto as Exhibit A is my most current *curriculum vitae.*

2. I have twice provided professional services to the U.S. Bureau of the Census. From 1975-1977, I served as an Assistant to the Division Chief, Population Division. From 1979-1980, I served as Staff Assistant to the Deputy Director, and in that capacity I helped to manage the 1980 Census. I have also served on the Hispanic Census Advisory Committees on the 1980 and 1990 Census, and was one of eight members of the national panel, constituted to individually advise the Secretary of Commerce on technical aspects related to the possible adjustment of the 1990 Census. My recommendation to the then Secretary of Commerce, Robert Mosbacher, was that the Post-Enumeration Survey be used to adjust the 1990 Census.

3. My areas of expertise are in demographic studies, racial and ethnic statistics, particularly on the Latino population of the southwestern U.S. I have several publications on Latino demographics, including immigration trends, citizenship, family composition, educa-

tional attainment, labor force participation and other aspects related to changes in the growth and distribution of demographic population groups.

4. I have extensive first hand experience with census enumeration procedures, issues related to the census undercount, dual estimation systems used to determine census undercount, and studies of the census undercount.

5. I am a demographically trained social scientist familiar with sampling theory, including sampling designs, sampling distributions, and sampling error.

6. I am also familiar with redistricting principles. I drafted two separate sets of statewide Congressional, Senate, and Assembly plans which MALDEF submitted to the California Legislature and to the California Supreme Court in *Wilson* v. *Eu*, 4 Cal. Rptr. 2d 379 (1992). The first set of plans was based on uncorrected 1990 Census data, which had disproportionately undercounted minority populations. The second set of plans was drafted in an attempt to correct the overpopulation of minority districts caused by the 1990 Census differential undercount. I also drafted the Los Angeles County Supervisorial Board remedial redistricting plans, which were adopted by the District Court in *Garza* v. *Los Angeles County*, 918 F. 2d 763 (9th Cir. 1990), a case in which I also testified as an expert witness. I have also drafted local redistricting plans for smaller jurisdictions, such as the Dinuba School Board and the San Diego City Council.

7. I have served as an expert witness in other cases related to voting rights and redistricting (*e.g.*, *Garza* v. *Los Angeles County*, *Romero* v. *City of Pomona*, *Aldasoro* v. *Imperial County ESD*, *Bonilla* v. *City of Chicago*, *Benavides* v. *Eu*), census undercount (*e.g.*, *City of New York* v. *U.S. Department of Commerce*), and jury pool analysis (*e.g.*, *State of California* v. *Corona*).

8. In forming the opinions and conclusions contained in this declaration, I have reviewed data, computations, reports, studies, and analyses, including materials prepared for review by the Census 2000 Advisory Committee, as well as the U.S. Department of Commerce, Bureau of the Census, *Report to Congress—The Plan for Census 2000*, originally issued July 1997, revised and reissued August 1997, and the U.S. Department of Commerce, Bureau of the Census, *Census 2000 Operational Plan*, July 1997, and have discussed the Census 2000 Operational Plan with Census Bureau personnel. All of the materials that I relied upon in forming my opinion are of the type reasonably relied upon by experts in the fields of demographic analysis and statistics, and sampling methodology.

9. I have also reviewed the Memorandum for Plaintiff United States House of Representatives in Support of its Motion for Summary Judgment (April 6, 1998).

10. In this declaration, I conclude that: census enumeration is not correctly characterized as a "head count" when one considers the nature of the traditional census methodology; that a complete "head count" is an impossibility; that undercount is unavoidable using traditional census methodology; that sampling is a recognized and valid statistical method; and that, in conjunction with the mail-out, mail-back method, sampling will lead to a more complete and accurate census.

THE CENSUS IS NOT A HEAD COUNT

11. Traditional census enumeration is not a "head count." More accurately stated, traditional census enumeration is a census of all known addresses. The enumeration procedure relies on a compilation of lists of addresses that are supplemented by addresses discovered through a canvassing process. Traditional census enumeration methodology is almost entirely based on the collection of a census form from every known address, either by mail or by interviewers. The mail-out, mail-back method is address-dependent and implemented by the U.S. Post Office mail carriers. When addresses fail to return their forms, interviewers are sent out to follow-up on those addresses in an effort to obtain census questionnaires from those addresses.

12. Traditional census enumeration is, in fact, an accounting for each address listed. The Census Bureau is typically aware at any given time whether a particular address has or has not returned its census form (or if the address has been determined to be unoccupied), but at no point is it known whether any one person is or is not included in the census. This is so because every census form received can be checked against a secondary data source—the master address list. By contrast, there is no secondary, independent data source to check for the coverage of persons reported. The Census Bureau's goal is to count all persons, but the traditional census methodology does not account for all persons, rather the Census Bureau's traditional census methodology tries to account for a census form from as many occupied addresses as possible.

13. There are a few exceptions to this address-based approach. A limited amount of time is set aside for Service Based Enumeration—enumerating persons who

live in "special places" like marinas, labor camps, etc.—and individual census reports are directly provided to those individuals for them to be counted. Enumeration in special places and such individual reporting comprise a minute portion of the overall population data.

14. The census does not make contact with every person. The Census Bureau accepts as valid information provided by a respondent who reports on others in the household. Should the respondent omit core information, such as age, sex, race and marital status, the census questionnaires will "fail edit", and telephone calls or personal visits are attempted to verify such information. However, if a census form is filled out completely, its information will be accepted at face value.

15. Thus, a census form that totally misrepresents the number or characteristics of persons living at a particular address is accepted as truthful without verification—if no items are omitted or logically inconsistent. Past studies that compare census enumerated households with their responses in the recanvassing, such as in the 1990 Post-Enumeration Survey, indicate that 69.5% of the net coverage errors were caused by mistakes in filling out the census form. (The remaining 30.5% of the coverage error came from failure to enumerate housing units.) (*Plan for the Census 2000*, p. 41)

16. Finally, traditional census enumeration includes inference. For example, in the case of last resort counting which occurs after multiple attempts by interviewers to obtain information directly, the traditional census methodology allows for "persons" as well as inferences about the characteristics of those persons to be as-

signed to households based on secondary sources and characteristics borrowed from a neighboring household. *Plan for Census 2000*, p. 23.

17. The proposed Census 2000 plan provides methodological solutions to the above-described problems that are inherent in the traditional census methodology.

UNDERCOUNT IS A CONSISTENT AND UNAVOIDABLE FEATURE OF CENSUS-TAKING

18. Census undercount, measured in different and reliable ways, has not been eradicated despite improved techniques, procedures and technology.

19. Since 1940, one measure of Census undercount was primarily inferential, comparing the census enumeration to birth, death and legal immigration data in demographic analysis. Undercount is the difference between the distribution of enumerated persons by age, gender and race and the estimated number of persons based on these other independent data sources. In the 1980's, undercount estimates were also measured by comparing the results from households enumerated in the census and the Current Population Survey. *Preparing for the 2000 Census, Interim Report I*, National Research Council, Committee on National Statistics, 1997.

20. In the 1990's, undercount estimates became more sophisticated and were measured by comparing census enumerated blocks with independently re-enumerated blocks by the Post-Enumeration Survey (PES). The PES was an independent procedure akin to a "recount" of every household in a sample of over 5,000 blocks selected to represent 116 kinds of neighborhoods. It was designed specifically for the purposes of

adjusting the 1990 census, and over two dozen evaluation studies of the PES confirmed that its quality and implementation met the highest standards. When the PES was compared to the original census enumeration it was possible to determine "person characteristics" of the undercounted, and use this information to adjust the data. For example, a set of characteristics could African American male, 20-29 years of age, unrelated to the head of household. Combining the block characteristics and the person characteristics yielded 1392 possible unique categorizations (referred to as stratum). The strata used for the selected blocks were based on prior knowledge of factors associated with census undercount, including race/ethnicity, gender, urban/rural, central city/suburb, and renter/owner. The Census Bureau was then able to use this information to adjust the flawed data to correct for the known undercount. (The Secretary of commerce later determined not to adopt the adjusted data as the "Official Count.")

21. Multiple studies of census undercount have identified the two sources of undercount error: a) errors in the census procedures; and, b) within household errors, primarily caused by the mis-listing or omission of eligible household members.

22. An address-based enumeration approach can be expected to have difficulties if the master address list is incomplete. According to the PES results following the 1990 Census, 30.5 percent of the net error came from housing units missed by the Census. (*Plan for Census 2000*, p. 41.) In addition, there are errors that arise in counting persons who are not permanently attached to a particular address. Examples of "non-address individuals" include migratory workers, the homeless, movers, and residents of illegally subdivided homes,

retirees living in recreational vehicles, etc. In some cases, persons with addresses seek not to be counted such as probation violators, debtors hiding from creditors, and battered spouses hiding from their partners. Finally, there are the persons who fear discovery by federal authorities, *e.g.*, undocumented immigrants.

23. Despite concerted efforts to inform the public about who is eligible and should be listed as a household resident, errors occur in the listing of household occupants. As noted earlier, 69.5 percent of the net error is attributed to mistaken inclusions or exclusions in enumerated households. For example, it is not atypical for infants, non-related household members, live-in caretakers or family members temporarily working in another city to be omitted. Within-household errors are exacerbated by English language proficiency.

24. Another historically consistent fact is that undercounting is differential, affecting some groups more than others. Every undercount study ever conducted has verified that undercount was more likely for youth, males, African Americans, Hispanics, Asian and Pacific Islanders, Native Americans living on reservations, inner-city dwellers and rural dwellers, and renters.

DIFFERENTIAL UNDERCOUNT IN THE 1990 CENSUS

25. Recognizing the persistence of differential undercount, the Census Bureau specifically targeted "hard-to-enumerate" groups with special programs in the 1990 Census. Millions were spent on public education, community outreach, media promotion, and streamlined procedures.

26. After making headway since 1970 in improving the overall undercount as well as in decreasing the gap

in the differential undercount, the 1990 Census retrogressed with a higher overall undercount and increased differential undercount.

Table 1: Percent Net Undercount and Persons Missed in the Census, 1940-1990.

YEAR	% NET UNDERCOUNT	NO. PERSONS MISSED
1940	5.4	7.5 MILLION
1950	4.1	6.5 MILLION
1960	3.1	5.7 MILLION
1970	2.7	5.7 MILLION
1980	1.2	2.8 MILLION
1990	1.8	4.7 MILLION

Plan for Census 2000, p. 2.

27. Consistent with past undercount studies, the PES found that undercount was higher for Native Americans (12.2%), Hispanics (5.0%), African Americans (4.4%), than for non-Hispanic whites (0.7%). In addition, urban renters had higher undercount rates (4.2%) than urban homeowners (.09%), and children, who represent 26 percent of the population, accounted for 52 percent of the persons omitted from the 1990 Census.

28. California had the highest numerical and proportional undercount in the 1990 Census, and cities with high minority populations had a disproportionately

higher rate of undercount. For example, Inglewood, California, with a minority population of 93%, had an undercount rate of 10.9%, while Simi Valley, California, with a minority population of 20.3%, had an undercount rate of 3.6%. *An Illustrative Set of Alternative PES Estimates of Under/Over Count Rates for Cities Over 100,000 Population*, Press Release CB91-221, Table 2 (June 13, 1991)

29. The differential impact of undercounting has a direct and severe impact on legislative redistricting, particularly for districts in which large numbers of minorities reside. For example, in California, the 1990 unadjusted census population was 29,760,021. The estimated California population, using the selected PES method, was 30,888,000. This means that the average population for California Assembly Districts using unadjusted population data was 372,000, while the average population using adjusted data was 386,000. Similarly, the difference in population due to the use of undercounted data in 1990 Senate districts was 28,200, and California Congressional Districts were off by 21,692 due to flawed population data. All districts were overpopulated, but because of the differential undercount in geographical areas containing high minority populations, minority districts were the most overpopulated, and in reality represented the highest deviations from the average district size.

A FULL-COUNT CENSUS IS NOT A POSSIBILITY USING TRADITIONAL CENSUS METHODS

30. A complete enumeration of the U.S. population using traditional census enumeration methods is not feasible or practical. The traditional census method, relying primarily on address lists and canvassing, results in in-house under-reporting during the mail-back period, and consistently undercounts certain "hard to count populations." Thus, even if the Census Bureau were able to accomplish a 100% listing of addresses, and receive back forms from every single address, it would still not result in a 100% "head count." Only by returning to a sample of the houses who mailed back forms and performing the thorough and complete "double check," would the Bureau be able to address the inaccuracies caused by in-house misreporting. Therefore, the ICM component of the Census 2000 Plan is the only methodology that can correct for within-household errors, errors that accounted for 69.5% of the net coverage errors in 1990.

31. Attempts to increase outreach in the use of the traditional census methodology will not result in substantial gains in enumeration. Historical evidence and numerous studies confirm the difficulties inherent in census enumeration and the limits of the traditional census methodology.

32. To approach a full-count census, the traditional census methodology must be done in conjunction with sampling, which is the only methodology that can reliably address the errors that prevent a complete and accurate enumeration.

SAMPLING IS A RECOGNIZED AND VALID STATISTICAL METHOD WHICH WILL RESULT IN RELIABLE ESTIMATES

33. Sampling is a common and accepted statistical method relied upon by social scientists, researchers, quality control specialists, farm owners, opinion pollsters, and other scientists and technicians. The question is not whether sampling is a proper statistical

method, but rather whether it is appropriate in conjunction with traditional methods for census enumeration.

34. The concept of sampling is based on an understanding of sampling distributions—normally, bell-shaped curves—that describe the possibility that any one sample will properly reflect that population from which it is taken. Sampling distributions also provide the basis for determining confidence limits around a sample estimate.

35. In general, the larger the sample, the more likely that sample will reflect the population from which it is drawn. For that reason, election polls based on several thousand respondents to reflect the opinions of the 100 million U.S. voting population have substantial standard errors. Despite the fact that the thousand or so respondents to a poll represent an infinitesimal proportion of all voters, the standard error is typically plus or minus 5 percent.

36. The sample designs that are proposed to be used in conjunction with traditional census methodology in Census 2000 represent exceedingly large sample proportions. For example, should 80 percent of occupied households in a census tract respond by mail, follow-up interviewers will interview half (50%) of all non-responding households to estimate the remaining households. Should 85 percent of the occupied households in a census tract respond to the census by mail, follow-up interviewers will interview one-third (33%) of all remaining non-respondent households before estimating the remaining households. Either of the samples illustrated above is substantially larger—and thus, more representative—than the proportion sampled in the vast majority of sample surveys. No matter how

large the percentage of mail-back responses is, the Census Bureau will always interview a minimum of 1 in every 3 non-responding households in each census tract. *Census 2000 Decision Memorandum, No. 34* (January 2, 1998)

37. When one considers that the Census Bureau estimates, on the average, that 67 to 70 percent of households will mail-back their census form, in the vast majority of cases, the final 10 percent of nonresponding households in a census tract will be estimated from interviewing 2 of every 3, or 66 percent of the persons in the pool of non-responding households. This sample proportion is more than sufficiently large and representative to provide highly reliable estimates.

38. Sampling error is known and understood and can transparently be taken into account by decision makers. In general, knowing the degree of error of a sample estimate allows decision makers who are using the data to ascertain a sample estimate's precision. For the purposes of understanding the quality and having confidence in the data, a known sampling error is far better than not knowing the extent of error around a census "head count."

39. Sampling will be used in conjunction with traditional census enumeration procedures. First, 90% of the households will be surveyed, by mail or by interview. These follow-up interviews, which will take place with at least 1 in 3 households who do not mail back forms, will be used to estimate the remaining 10% in each Census tract during the initial phase of the Census. In making those estimations, the households that fail to respond by mail are not assumed to be alike. Sampling methodology identifies characteristics of a representative sample, and imputes those characteris-

tics to a larger population. Thus, in the post mail-back period, non-responding households are assumed to be part of a subgroup of households that can be identified through representative sampling. Non-responders are more likely to share characteristics with fellow non-responders than with those who mailed back their form.

40. Past experience indicates that the mail-back response period followed by canvassing by Census enumerators can attain 90 percent coverage for every census tract. The 90 percent threshold is a reasonable an attainable goal whose level is consistent with complementary evaluative programs, *i.e.*, the Integrated Coverage Measurement (ICM).

41. Additional sampling will take place during the second phase of the Census that will involve interviews of a random population sample of approximately 750,000 housing units in blocks selected to reflect all racial and ethnic groups, and all sizes of towns and rural areas from all areas of each state. This is an evaluative program that will inform the Bureau what proportion of the people in each sample block was omitted from the original count, either through in-house reporting errors or because entire housing units were missed. If persons in a block were missed, they will be added to the count. Deductions from the census enumeration would only occur in the case of literal duplication of people or residences, and estimations made during the initial phase may be reduced upon a finding of a net overcount in a particular area, *i.e.*, in an area where the overcount exceeds the undercount.

42. The use of sampling in Census 2000 will produce more accurate data at the National level, the State level, the Congressional District level, and the census tract level. The estimated error rates for each of those

levels will be lower than the error rate that will result without the use of sampling. *Plan for Census 2000*, pp. 44-45.

43. Sampling is a well established method known and used by many researchers. All decisions related to the sampling process can be evaluated. The Census Bureau has stated that it will make public any formula used for the estimation, calculations of standard errors and confidence limits as well as the sample sizes. Individual statisticians are capable of verifying the results and the assumptions for each step of the process. The transparency of the sampling process is its best protection against the possibility of manipulation. *Plan for Census 2000*, pp. 49-51.

44. In sum, sampling corrects for the historical inaccuracies related to coverage of households and persons within households. The Integrated Coverage Measurement will correct for mistakes within enumerated households and provide information on nonsampling error caused by census procedures. The Census 2000 Plan will provide more accurate and complete data that will reduce, if not eliminate, the differential undercount of past Censuses.

I declare under penalty of perjury that the foregoing is true and correct. If called upon to do so, I could and would so testify. Executed this 30 day of April, 1998, in Washington D.C.

/s/ LEOBARDO F. ESTRADA
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EDUCATIONAL BACKGROUND:
Florida State University, Ph.D Sociology/Demography, August, 1970
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RELEVANT SKILLS:
Social research methodology, data reduction and data analysis, demographic analysis, social policy research, redistricting methodologies.

SPECIAL AREAS OF INTEREST:
Demography and Urbanization, Statistics and Research Methods, Hispanic Population of the U.S., Inner City Urban Planning, Hispanic market research.

PROFESSIONAL POSITIONS:
Director, North American Integration and Development Center, School of Public Policy and Social Research, University of California at Los Angeles (1995 to present)

Associate Professor of Urban Planning, School of Public Policy and Social Research, UCLA (1977 to present)
Senior Consultant, Diversified Data Systems, Inc. (1994 to present)
Senior Vice President for Research, NuStats, International (1990 to 1995)
Senior Scholar, The Tomas Rivera Center, Claremont, CA (1985–91)

PREVIOUS WORK EXPERIENCE:
Staff Assistant to the Deputy Director, U.S. Bureau of theCensus, Washington, D.C. (9/79–12/80).
Visiting Associate Research Scientist, Institute for Social Research, University of Michigan, Ann Arbor, MI (Summer 1977-79, 82).
Special Assistant to the Division Chief, Population Division, U.S. Bureau of the Census, Washington, D.C. (8/75–8/77).
Associate Professor, Department of Sociology and Anthropology, North Texas State University, Denton, TX (9/70–7/77).

BOOKS AND MONOGRAPHS:
Individuals in Society: A Modern Introduction to Sociology, with James A. Kitchens, Charles Merrill and Company, 1973.
Cuantos Somos: A Demographic Study of the Mexican American Population, with Teller, Hernandez and Alvirez, Mexican-American Studies Center, University of Texas, Austin, TX, 1977.
The Changing Profile of Mexican-America: A Source-book for Policy Makers, Tomas Rivera Center, Claremont, CA, 1986.
Tidal Wave II: An Evaluation of Enrollment Projections for California Higher Education, with David Breneman and Gerald Hayward, Technical

Report #95-6, The California Higher Education Policy Center, September, 1995.

ARTICLES IN PROFESSIONAL JOURNALS AND BOOKS:

"Census Data and the Problems of Conceptually Defining theMexican-American Population," with Jose Hernandez and David Alvirez. *Social Science Quarterly*, Vol. 52, March 1973, pp. 671-687.

"A Comparison of the Mexican Population in the Midwest and Southwest," *Aztlan*, Vol. 7. No. 2, 1978.

"Language and Political Consciousness Among the Spanish-speaking in the United States: A Demographic Study," *Bilingualism and Language Policy in the U.S.*, Center for Policy Studies, University of Chicago, 79.

"The Responsibility to Know and the Ability to Understand: Policy-making with Hispanic Perspectives," *METAS*, Vol. 1, No. 3, Fall, 1980.

"Chicanos in the U.S.: A History of Exploitation and Resistance," with Maldonado, Macias and Garcia, *DAEDALUS*, Vol. 110., No. 2, Spring, 1981. Reprinted in *Majority and Minority*, N.R. Yetman (ed.), 5th Edition, Boston, MA, Allyn and Bacon, 1985, pp. 162–82.

"Research on the Magnitude of Mexican Undocumented Immigration to the U.S.: A Summary," with Manuel Garcia y Griego, *Mexican Immigrant Workers in the U.S.*, A. Rios-Bustamante (ed.), Chicano Studies Research Center, U.C.L.A., 1981.

"The Importance of Demographic Data for Informa tion Providers: An Illustration of the Latino Popula tion," in F. Garcia-Ayvens and R. Chabran (eds.), *Biblio-Politica*, Chicano Studies Library

Publications, University of California, Berkeley, 1984.

"The Extent of Spanish/English Bilingualism and Language Loyalty in the U.S.," *Aztlan*, Vol. 15, No. 2, Fall, 1985, pp. 379-392.

"Dynamics of Hispanic Populations," *Social Thought*, Vol. 11, No. 3, Summer, 1985, pp. 23–39.

"Los Angeles Neighborhoods: Organization and Conflict," in J. Dimento, I. Graymer and F. Schnidman (eds.), *The Urban Caldron*, Oelgeschlager, Gunn, and Hain/Lincoln Institute of Land Policy, Boston, 1986, pp. 99–102.

"Hispanics," in Rosen, et al. (eds.), *Encyclopedia of Social Work*, National Association of Social Workers, Silver Spring, MD, 1987, pp. 732–39.

"Mortality Research on Hispanics: Challenges and Opportunities," *Proceedings of the 1987 Public Health Conference on Records and Statistics*, U.S. GPO, Washington, D.C., 1988.

"Economic Development Policy Analysis," in H. Romo (ed.), *Latinos and Blacks in the Cities*, The LBJ Library and the LBJ School of Public Affairs, Austin, TX, 1990, pp. 107–111.

"Survival Profiles on Latino Nonprofit Organizations," in H. Gallegos and M. O'Neil (eds.), *Hispanics and the Nonprofit Sector*, The Foundation Center, New York, NY, 1991, pp. 127–138.

"Ethnic Self-Identification and Labeling," in G.P. Knight and M. Bernal (eds.), *Ethnic Identification*, University of Arizona, Tucson, 1992.

"Deficiencies of Hispanic Data for Public Health Planning," with J. Delgado, *Public Health Reports*, May, 1993.

"Mending the Politics of Division in Post-Rebellion L.A.," with S. Sensiper in A.J. Scott and E.R. Brown, (eds.), *South Central Los Angeles: Anatomy of an Urban Crisis*, Working Paper No. 6, Lewis Center for Regional Policy Studies, U.C.L.A., June, 1993.

"The Politics of the Census: A Reflection of the Dilemmas in U.S. Society," *Proceedings of the Joint Canada-United States Conference on Measurement of Ethnicity*, GPO, Washington, D.C., September, 1993.

"The Dynamic Demographic Mosaic Called America: Implications for Education," *Education and Urban Society*, Vol. 25, No. 3. May, 1993.

"Immigration Issues and Policy in California," in Institute of Governmental Studies, University of California Berkeley, (forthcoming).

OTHER PUBLICATIONS:

"Racial/Ethnic Classifications in U.S. Censuses," *Intercom: The International Newsletter on Population*, Vol. 4, November 11 (1976).

"Spanish Heritage Classification in U.S. Censuses," *Intercom*, Vol. 4, No. 12 (12/76).

"Senior Programs: Growth or Decline in the Next Five Years," *Somos*, Vol. 1, No. 5, (10/78).

"Review and Analysis of Hispanic Youth Employment Data Collection Systems and Reporting Methods," *Hispanic Youth Employment: Establishing a Knowledge Base*, National Council de la Raza, Washington, D.C. (10/79).

"Demography, Declining Enrollment and the 1980 Census," *Desegregation: Integration*, Report of the 18th Annual NEA Conference on Human and Civil Rights in Education, Washington, DC, 1980.

"Hispanic Realities of the Eighties," *Foundation News*, 1981.

"Demographic Studies on Chicanos," *La Red*, No. 54,(6/82).

"The Significance of the 1980 Census for Latinos," *Caminos*, (10/82).

"Hispanic Voting Trends: A Demographic View," *El Mirlo*, Vol. 10, No. 1, Winter, 1982.

"The Latinization of the U.S.," *Our Barrio Past, Present, and Future*, Chicano Architecture Students Association, University of California, Berkeley, 1983.

"Demographic Characteristics of Latinos," *Chicano Law Review*, Vol. 6, No. 7, UCLA School of Law, Los Angeles, CA, 1984.

"Hispanic Transit Dependent Populations," *American Planning Division Newsletter*, Vol. 8, No. 3, (7/86), pp. 10–14.

"Understanding Demographics: the Case of Hispanics in the U.S." in L.B. Brown, J. Oliver and J.J. Klor de Alva (eds.), *Sociocultural and Service Needs in Working with Hispanic-American Clients*, School of Social Welfare/Nelson A. Rockefeller College of Public Affairs and Policy, State University of New York at Albany, 1985.

"Mexican Immigration?" *California Tomorrow*, Vol. 1, No. 1, Summer 1986, pp. 22–27.

"Critique of Migrant Farmworkers: Numbers and Distribution" by Martin and Holt, with D. Villarejo and P. Barnett, California Rural Legal Aid Foundation (5/87).

"Anticipating the Demographic Future," *Change* (5/88), pp. 14–19.

"Communities in Transition: South Bay Cities and The Northern Valleys," Southern California Gas Company, 1988.

"The Demographics, of California's Latinos: Maps and Statistics," Rose Institute, Claremont McKenna College, Claremont, CA, 1988.

"Comunidades Hispanas en los Estados Unidos," in M. Ramirez, et al. (eds.), *Latinos in the Making of the U.S. Yesterday, Today and Tomorrow*, N.Y. State Department of Education, 1989.

"Hispanic America: Recent Trends," *Oxford Analytica*, Oxford, U.K, No. 23 (10/89).

"A Survey of Latino Leadership's Concerns and Needs," Tomas Rivera Center, Claremont, CA, 1990.

"A Latino Community Survey to Identify Latino Concerns and Needs," Tomas Rivera Center, Claremont, CA, 1990.

"Hispanic Evolution," *Foundation News*, Vol. 31, No. 3 (6/90).

"Labor Market Prospects for a Diverse Los Angeles," *Los Angeles Economic State of the City, 1991*, L.A. City Council, Community and Economic Committee (1/91).

RESEARCH PRESENTATIONS AT PROFESSIONAL MEETINGS SINCE 1985:

45th Congreso Internacional de Americanistas, Bogota, Colombia (7/19/85).
American Planning Association, Los Angeles, CA (4/6/86)
Sociology of Education Conference, Asilomar, CA (2/14/86).
National Education Association, Louisville, KY (6/28/86).
California Post-Secondary Education Commission, Asilomar, CA (7/21/86).
Texas State Department of Aging Annual Conference, (9/3/86).
California State University, Los Angeles, CA (1/29/87)
Council on Foundations, Atlanta, GE (3/30/87)
American Association of Higher Education, Chicago, IL (3/4/87)
Binational Conference on Health, Guadalajara, Mexico (11/12/87)
Conference on Achievement for Minority Students, Los Angeles (11/16/87)
California Association of Community Colleges, Santa Clara, CA (11/21/87)
Western Interstate Coalition for Higher Education, Phoenix, AZ (11/22/87)
Santa Barbara City College (3/15/88)
Seminario Internacional Sobre Regionalismo y Desarollo, Punta Arenas, Chile (3/24/88)
Los Rios Community Colleges, Sacramento, CA (4/6/88)
Conference on Family Influences on Mexican-American Acculturation, Tempe, AZ (4/28/88)

Comparative Ethnicity Conference, UCLA,
Los Angeles, CA (6/2/88)
XVI Congreso Interamericano de Planificacion,
San Juan, PR (8/23/88).
American Planning Association,
Palm Springs, CA (10/24/88).
Annual Conference of Ford Foundation Doctoral
Minority Fellows, National Research Council,
Washington, DC (11/3/88)
Conference on the Future of Latino Non-Profit
Organizations, San Francisco, CA (11/14/88)
Community Planning and Action Project,
Rockefeller Foundations,
San Antonio, TX (1/19/89)
University of North Texas,
Denton, TX (9/29/89)
San Diego State University,
San Diego, CA (11/28/89)
Texas Lyceum Conference,
Austin, TX (1/26/90)
Cross Cultural Colloquium Series, American
University, Washington, DC (1/30/90)
Cabrillo College,
Watsonville, CA (2/1/90)
University of Colorado,
Boulder, CO (2/7/90)
LBJ School of Public Affairs,
Austin, TX (2/11/90)
Corpus Christi State University,
Corpus Christi, TX (4/6/90)
University of Northern Colorado,
Greeley, CO (4/28/90)
Population Association of America,
Toronto, Canada (5/3/90)

Austin Fund Lecture, Wayne State University,
Detroit, MI (6/4/90)
Institute for Regional Studies of the Californias,
Tijuana, BC (7/29/90)
American Statistical Association,
Anaheim, CA (8/6/90)
Whittier College,
Whittier, CA (10/3/90)
Rutgers University,
Camden, NJ (10/22/90)
Rural Sociological Society,
Norfolk, VA (1/15/91)
University of California at San Diego,
La Jolla, CA (2/28/91)
Western Governmental Research Association,
Anaheim, CA (4/9/91)
Community and Public Issues Council of Conference
Board, Los Angeles, CA (10/2/91)
Academy of Justice,
San Diego, CA (10/2/91)
California Board of Corrections,
Redding, CA (10/6/91)
University of Southern California,
Los Angeles, CA (10/24/91)
Newspaper Research Council,
Dallas, TX (11/11/91)
Hospital Council of Southern California,
Pasadena, CA (12/10/91)
League of California Cities,
Monterrey, CA (2/10/92)
California Probation, Parole and Correctional
Association, San Diego, CA (6/13/92)
Center for U.S.-Mexican Studies, University of
California, San Diego, CA (6/23/92)

Surgeon General's National Workshop on
Hispanic/Latino Health, Washington, DC (9/29/92)
Oldenborg Center for International Relations,
Pomona College, Claremont, CA (10/2/92)
Chicano/Latino Intersegmental Convocation,
Los Angeles, CA (11/16/92)
Texas A&M University,
College Station, TX (12/10/92)
University of Texas at San Antonio,
San Antonio, TX (2/26/93)
U.C.L.A. School of Law,
Los Angeles, CA (2/6/93)
Centers for Disease Control,
Atlanta, GE (3/1/93)
Bet Gabriel International Symposium,
Tiberius, Israel (5/5/93)
Commission on Security and Cooperation in Europe,
Warsaw, Poland (5/25/93)
Public Telecommunications Financial Management
Association, Palm Springs, CA (6/2/93)
Sociology of Education Annual Meeting,
Asilomar, CA (2/3/95)
National Association of Child Care Referral Agencies,
Washington, D.C. (2/24/95)
National Association of Area Agencies on Aging,
Los Angeles, CA (7/25/95)
Independent Sector Annual Meeting,
Boston, MA (10/23/95)

CURRENT MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS:

American Sociological Association
American Statistical Association
Population Association of America
Association of Borderland Scholars
American Public Health Association
Rural Sociological Association
American Association of Schools in Planning
American Planning Association

PRESENTATIONS TO COMMUNITY GROUPS AND ORGANIZATIONS SINCE 1985:

National Association of Latino Elected and
Appointed Officials, Washington, DC (11/22/85)
California Association of Principals,
Los Angeles, CA (11/21/85)
Santa Monica College Associates (6/16/86)
Raza Administrators and Counselors in Higher
Education, Fresno, CA (10/l/86)
California Coalition for Public Education,
Los Angeles, CA (10/10/86)
Kern County Chamber of Commerce,
Bakersfield, CA (11/14/86)
California Teachers Association,
Palm Desert, CA (2/10/87)
Mexican American Opportunities Foundation,
Los Angeles, CA (2/27/87)
California State Senate Subcommittee on Family
Policy,
San Francisco, CA (3/21/87)
Coalition on Economic Development,
Los Angeles, CA (4/21/87)
University of California Board of Regents,
San Diego, CA (6/18/87)

Midwest Voter Registration and Education Project, Chicago, IL (6/26/87)
International City Association, Rancho Bernardo, CA (6/10/87)
Subcommittee on Census and Population, U.S. Congress, Washington, D.C. (7/14/87)
National Conference of Christians and Jews, Pomona, CA (10/28/87)
Texas Coordinating Board on Higher Education, Austin, TX (4/5/88)
Adopt-a-School Appreciation Breakfast, LAUSD, Los Angeles, CA (4/13/88)
Child Welfare League of America, Pasadena, CA (4/13/88)
California Community College Board of Governors, Palm Springs, CA (4/16/88)
Council on Foundations, Los Angeles, CA (3/25/88)
California Association of Correction Officers, Irvine, CA (6/19/88)
Command College, California State Department of Justice, Pomona, CA (7/14/88)
National Education Association, New Orleans, LA (6/29/88)
Southern California Society of Consumer Affairs Officers, Los Angeles, CA (8/18/88)
American Association of School Administrators, Washington, DC (9/14/88)
Local Government Commission, Lake Arrowhead, CA 9/16/88)
La Ley (Association of Hispanic Enforcement and Probation Officers), Pasadena, CA (10/13/88)
Sacramento County Office of Education, Sacramento, CA (12/6/88)

National Association of Hispanic Publishers, Las Vegas, CA (1/11/89)
Ethnic Market Dynamics, San Diego, CA (9/12/91)
Department of Public Works Management Action Committee, Los Angeles, CA (6/28/92)
National Community College Hispanic Council Leadership Seminar, Flagstaff, AZ (6/92)
National Lawyer's Guild, Los Angeles, CA (9/10/92)
Protection and Advocacy, Inc., Glendale, CA (11/4/92)
LAUSD's Senior High School Principals, Los Angeles, CA (10/21/93)
Daniel Freeman Hospital, Palm Springs, CA (10/4/93)
Cambridge College Board of Trustees, White Plains, NY (9/95)

ADVISORY BOARD MEMBERSHIPS:
Census Advisory Committee on Populations Statistics, US Bureau of the Census, Washington, DC (1973-75)
Board of Directors, Asociacion Nacional Pro Personas Mayores, Los Angeles, CA (1978-)
Panel on Decennial Census Plans, Committee on National Statistics, National Research Council, Washington, DC (1978)
Panel on Work, Family and Community, Committee on Child Development, National Research Council, Washington, DC (1978-81)
National Institute of Education, Desegregation Studies Group, Washington, DC (1980-82)
Delegate, White House Conference on Aging, Washington, DC (Nov.-Dec., 1981)

National Committee for Research on the 1980 Census, Social Science Research Council, New York, NY (1981-1983)
Advisory Board on Immigration Issues, Urban Institute, Washington, DC (1983)
Advisory Panel on Language Minority Children, Educational Testing Service, Princeton, NJ (1984-85)
Advisory Board of the Southern California Social Survey, Institute for Social Research, UCLA, Los Angeles, CA (1984)
Subgroup to Evaluate the U.S. Standard Certificate of Life Birth, U.S. National Center for Health Statistics, Washington, DC (1984-1986)
Advisory Board, Committee for Public Policy Research on Contemporary Hispanic Issues, Inter-University Program for Latino Research/Social Science Research Council, Austin, TX (1985-88)
Advisory Board, Latino Naturalization Project, National Association of Latino Elected and Appointed Officials, Washington, DC (1985-88)
Advisory Board, Non-Voter Study, Committee for the Study of the American Electorate, Washington, DC (1985-86)
Hispanic Advisory Committee on the 1990 Census, U.S.Bureau of the Census, Washington, DC (1986-90)
Advisory Committee, Economic Development in Southern California, Southern California Association of Governments, Los Angeles, CA (1987)
Panel on Rural Economic Development, Aspen Institute/Ford Foundation, Washington, DC (1987-91)
Board Member, LA 2000 Partnership, Los Angeles, CA (1988-)

Board of Directors, El Pueblo Community Development Corporation, Los Angeles, CA (1987-)
Broadcast Advisory Council, Hallmark, Inc., Kansas City, MO (1987-91)
Advisory Board, California Policy Seminar, Berkeley, CA (1988-)
Board Member, Latino Issues Forum, San Francisco, CA (1989-93)
Special Advisory Panel on the 1990 Census Adjustment, Office of the Secretary, U.S. Department of Commerce, Washington, DC (1989-91)
Board of Directors, Broadway Stores, Inc. (1992-1995)
Advisory Board on Transportation Statistics, Bureau of Transportation Statistics, Washington, D.C. (1995-)

EXAMPLES OF LEGAL EXPERT CONSULTANTSHIPS
Romero v. City of Pomona, CA
State of California v. Corona
Garza v. County of Los Angeles, CA
Reyes v. Dinuba Unified School District, CA
Aldasoro v. City of El Centro, CA
Valadez v. City of Santa Maria, CA

EXAMPLES OF CONSULTANTSHIPS
Southwest Voter Registration and Education Project, San Antonio, TX
Mexican American Legal Defense and Education Fund, Los Angeles, CA
Tomas Rivera Center, Claremont, CA
California Youth Authority, Sacramento, CA
Anheiser-Busch, Inc., St. Louis, MO
National Hispana Leadership Institute, Denver, CO
Population Resource Bureau, Washington, DC
Ford Foundation, New York, NY
National Institute on Drug Abuse, Rockville, MD

Command College, Commission on Peace Officer Standards and Training, Sacramento, CA
Southern California Gas Company, Los Angeles, CA
Pacific Bell Company, San Francisco, CA
General Telephone Company, Dallas, TX

FELLOWSHIPS/AWARDS
Kellogg National Fellow (1984-87)
John P. McGovern Lecturer in Allied Health, Center for Allied Health Sciences, University of Texas at Houston, (1988)
Hixson Lecturer, Baylor University, School of Education,
Waco, TX (1990)
Community Service Award, MALDEF, (1991)

ASSESSMENT OF ACCURACY OF ADJUSTED VERSUS UNADJUSTED 1990 CENSUS BASE FOR USE IN INTERCENSAL ESTIMATES

REPORT OF THE COMMITTEE ON ADJUSTMENT OF POSTCENSAL ESTIMATES
BUREAU OF THE CENSUS
DEPARTMENT OF COMMERCE
AUGUST 7, 1992

* * *

Estimated Undercount

June 1991

Population Group	Undercount Estimate	Sampling Error
U.S. Total	2.08%	.18%
Black	4.82	.29
Asian and Pacific Islander	3.08	.47

July 1992

	Undercount Estimate	Sampling Error
	1.58%	.19%
	4.43	.51
	2.33	1.35

American Indian, Eskimo, or Aleut	4.77	1.04	4.52	1.22
Hispanic (Can be of any race)	5.24	.42	4.96	.73

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